ARMY RESEARCH AND DEVELOPMENT

July 1972

SPEAKING ON . . .

Army Management: The Care and Feeding of Innovators

GEN William C. Westmoreland

Army Chief of Staff General William C. Westmoreland stressed the need for innovation in research and development, and the current challenge to management presented by the cutback in funding and manpower resources, in an address to an Army Materiel Command Executive Seminar, as follows:

It is a pleasure for me to be here this morning to address this representative gathering of the Army's largest organization—the Army Materiel Command. I must say that your vital statistics are quite impressive—133,000 civilian and 14,000 military working under nine subordinate commands in 92 installations located in the United States and throughout the world.

One does not have to do a lot of research to discover that the job you do is as tough and complex as it is necessary. The rest of the Army depends on you. You are, in essence, the Army's life-support mechanism. On you and on the people of AMC, the soldier depends for his food, clothing, shelter, transportation and—most importantly—for his combat equipment.

I would like to be able to tell you that your job will soon be easier—but you know that will not be the case. The job you will have to do . . . the tasks you will be called upon to perform . . . are likely to be tougher in the years and days to come. There is every possibility that we will ask you, as we have asked our logistic services in the past, to do more . . . more efficiently . . . with less.

With this thought in mind, I would like to share with you some of my ideas on the challenges we face and what I feel we must do to meet them successfully.

The first of these challenges has been around as long as human beings have gathered themselves together in organizations. It is the challenge of management. The leaders of an organization as large, diverse and scattered as the Army Materiel Command face an immense task.

As you gentlemen well know, the organizational goals of a large organization must constantly be defined and refined. Practical attainable objectives must support these goals at every level of the operation. These goals and objectives must be understood and acted upon at every facility and office you control—if your job is to be well done.

With your wealth of experience, I am sure you know that goal setting and attainment is not a matter of wiring diagrams on organization charts, of messages and reports from the field, of analysis and publication of data. This is true because the problems you face in meeting the goals you have set are human in origin and in resolution.

The human objective all of us must keep in mind is the American fighting man. He is, without doubt, the best-supported, best-equipped soldier in the world. Your job, whatever the specialty of your management task, is to keep him that way. That goal can be translated into objectives of personal and equipment efficiency, combat readiness, lowest cost, ease of transport and simplicity of maintenance that must motivate actions whatever your job.

This is a human task. Well-constructed organizations and well-written SOPs (Standard Operating Procedures) will help good people operate more efficiently. They will not, make good people out of poorly motivated ones.

Here again, efficient management requires human care and concern—keeping human objectives in mind. Efficient managers, with due respect for the personalities that make up their organizations, must care for their people as a gardener carefully tends his plants—removing the weeds and deadwood, encouraging growth, and warding off pests.

Let me be quick to say that the growth I want managers to encourage is not the growth of staffs, organizations and functions. The most important growth, the best indication of the health of any organization, is its production and development of new ideas and the size of its crop of innovators. If I could write one text, and make it required reading for all Army managers, I would title it "The Care and Feeding of Innovators."

Innovators can be defined as those sensitive to a need and, most importantly, those who accept responsibility for a solution to that need. Unless the manager rectifies the situation, the tendency of an organization, particularly a large organization, is to stifle both innovators and innovation. Your task as managers is to recognize, encourage and develop innovation within the area of your responsibility.

If your organization, section, division or branch is not to stagnate, you must reward your innovators. Most importantly, and this is most difficult, you must give them a chance to make mistakes. Innovators will not blossom without a great deal of coaxing. Often—and I know you are aware of this—what innovators suggest will tend to upset the apple cart.

When the apple cart gets in the way of our higher objectives, so much the worse for the apple cart.

New ideas are important. In a crop of 100, you may find only one that provides the solution for which you have been looking. You must reward and encourage the 99 ideas you don't buy in order to get the one you very much need. You must simultaneously keep in mind, and your subordinates must understand, the goals and objectives you have set and are trying to reach. Only by this method will innovation, once encouraged, produce desired results.

Granted that we can define our objectives and make known our goals—assuming that we can develop our innovators and make use of their innovations—what key problems face every Army agency concerned with the research, development and production of materiel?

What problems do we want our innovators to address? I would suggest time, technological trade-off, and testing.

The first of these, time, is a precious combat resource. As you well know, time is money. In combat and in materiel development, time may also mean lives. Looking at the entire life cycle of a piece of equipment, which directly or indirectly supports the combat soldier, we must aggressively seek to discover—and eliminate—the bottlenecks that cost us precious time.

(Continued on page 31)

ARMY RESEARCH AND DEVELOPMENT

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ABOUT THE COVER:

A new construction technique called "explosive excavation," being developed by the U.S. Army Corps of Engineers, is put to good use in this detonation of four 10-ton charges in a 120 foot square array to form the berthing basin of a small boat harbor 300 foot square. The approach is to bury a row or rows of large charges in a pattern and at the optimum depth to produce the desired excavation. This is evidenced on the back cover which shows a 1,370-foot long by 150-foot wide channel made by explosive excavation with a single row of charges.

Editor . . . . . **Clarence T. Smith**
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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Selective Scanner . . .

Recycling Waste to Potable Water Tested

A nuclear system for recycling all human wastes into potable water and converting spacecraft cabin wastes to ash that may be easily stored during extended space flights of the future is undergoing laboratory testing.

Fueled by plutanium-238, the system was develaped by the Atamic Energy Cammission (AEC) in coaperation with the National Aeronautics and Space Administratian (NASA) and the U.S. Air Force.

General Electric, which built the device under AEC contract, is testing a flight type model for 180 days beginning last month at GE's Space Division at King of Prussia, Pa. Manned tests in a space simulatar will be held later.

The system collects and recycles washwater, cabin candensate, human waste, cabin trash and food particles along with containers, plastic, clothing items and ather nonmetallic scraps.

A report claims at least 98 percent of all liquid waste processed by the system is recaverable as sterile water meeting the highest standards of purity. Solid waste, after all moisture is removed, is incinerated into an ash having a volume about 100 times less than the original product.

Solid wastes are fed into a shredder, then pumped inta an incinerator-sterilizer. The liquids move into the evaparator which heats the material under vacuum. Water vapor is piped into the pyralysis unit for sterilization and is then candensed far starage as sterile water.

Drinking, washing and other water needs tatal an estimated 15 pounds per astronaut each day. Volume and launch restrictions rule aut an anboard water supply far extended missions.

The new water recovery device, which weighs about 750 pounds, is designed for a minimum operation of six months and a maximum missian of three years or langer. The plutonium-238 fuel has a half life of 87.8 years.

Color Film Processing Time Reduced

Technical advances that reduce the time for processing calor film and prints from abaut an hour ta 11½ minutes and a simplified method for making color prints were announced by HQ U.S. Army Electronics Command, Fart Monmouth, N.J.

Leader in the develapment af both new pracesses is Miss Marilyn Levy, a physicist of the Photo-Optics Technical Area, Combat Surveillance and Target Acquisition Laboratory, ECOM. Details were revealed in papers presented at the annual canference of Phatographic Scientists and Engineers in San Francisco.

Associated with her in the development of a rapid color chemistry ta process Eastman Kodak Ektacalor-S and Kadacolar-X color negative films is 1LT Harmon A. Willey.

The new system uses the unexpased pracessed partian at the end af the film rall ta determine colar printing balance. An operatar of minimum skill can make a carrectly balanced and true colar print after only ane trial. Assaciated with this praject was 1LT Richard G. Le Schander, ECOM.

Army Environmental Impact Statements Filed

Draft and final environmental impact statements prepared during the first quarter of Calendar Year 1972 by the U.S. Army Corps of Engineers were filed recently with the Council on Environmental Quality.

Fifty-seven draft and 44 final statements were filed, bringing the tatal number af environmental impact statements filed by the Carps with CEQ ta 542, including 236 draft and 306 final statements.

Copies af the current compilation (Vol. II Jan.-Mar. 1972) and Vol. I (1970–1971) are available upon request to Public Affairs Office, Office, Chief of Engineers (DAEN-PA), Washington, D.C. 20314.

Army Acts on ABM Treaty Agreements

Orders issued by Secretary af Defense Melvin R. Laird to implement the intent af the antiballistic missile treaty signed during President Nixan's visit ta Moscaw are being effected by the Army. Farmal treaty ratificatian by Cangress is pending.

Instructed to "mave with prudent speed ta abide by the abligatians of the histaric arms limitatian agreements," the Army is carrying out Secretary Laird's arders ta suspend canstruction af the Safeguard System site at Malmstram Air Farce Base, Mont. Future work planned at other Safeguard sites alsa is suspended, except that Safeguard deplayment at Grand Farks AFB, N.D., is praceeding accarding to the ariginal plan.

Secretary Laird's directive ta the Army requires the planning af deployment of an ABM defense of natianal command, cantrol and communicatians capabilities at Washingtan, D.C., within the provisions af the treaty, on the "fastest reasanable schedule."

Directed alsa is the suspensian af all ABM research and development programs prohibited by the treaty. In presenting comprehensive testimany to Congress on the ABM treaty and the interim agreement on strategic offensive systems, Secretary Laird is expected ta detail as much information as can be issued for public release.

Energy Doubled in Newly Developed Battery

Double the energy capacity of canventional dry batteries of like size is stored in a newly developed lithium-organic eletralyte battery, it was reported at the 25th Pawer Sources Symposium, May 23–25, at Atlantic City, N.J. More than 800 U.S. and foreign representatives participated.

Energy density of the new battery at 70° F. is about 100 watt-hours per paund with maderate ta light laads, and in excess of 55 watt-hours per pound at a 5-haur rate. About 50 percent of the 70 degree performance is pravided at 20 degrees.

The potential af the lithium-arganic electralyte battery has stimulated investigative interest far several years. Only during the past two years has progress in develaping this type of battery demanstrated the temperature operatianal qualities and the starage characteristics ta make it a practical battery, it was reported at the canference.

Army Materiel Command Deputy for Laboratories Dr. Robert B. Dillaway gave the banquet address, focused on the pending national energy crisis and the critical requirement to investigate and develop pawer saurces. He cited the engineering challenges of fuel cells and magnetodynamics, cryagenic super-conductive transmissian lines, and nuclear and solar energy saurces as among research areas requiring innovative appraaches.

MSR Pacific Test With Sprint Successful

A Sprint missile, launched fram a remate site and cantralled by a research and development Missile Site Radar (MSR), "intercepted" an ICBM-type target nosecane in a recent test over Kwajalein Atoll in the Pacific Ocean.

The test demonstrated the capability af the MSR and its assaciated data processor to launch and guide a Sprint missile fram a site same distance fram the radar to a medium-range, medium-altitude point of intercept. It was the second test launch from Illeginni Island, 18 miles fram Meck Island where the MSR is located.

The target nosecane was launched by a Titan II ICBM fram Vandenberg Air Force Base, Calif. The Sprint interceptar missile passed clase enaugh to the target, as verified by radar instrumentatian, ta accamplish the intercept. Neither the Sprint nar the target carried an explasive warhead.

The MSR and the assaciated data processar which guided the interceptar missile are similar to equipment planned for the Safeguard ABM System.

This is the 27th test in the Safeguard system series.

HumRRO Receiving Microfiche Service

"Selective Disseminotion of Microfiche," a service of the National Technicol Informotion Service (NTIS), is now being received at the Van Evera Library of the Human Resources Reseorch Orgonizotion (HumRRO).

Under this subscription, the library outomaticolly receives microfiche copies of oll documents accessioned—in selected categories—by NTIS during the preceding half-month. Automotic distribution permits NTIS to offer this service at 35¢ instead of 95¢ per title.

Categories of reports which HumRRO is now receiving routinely ore: administration and monagement; documentotion ond informotion technology; humon factors; engineering; personnel selection, troining, and evaluotion; psychology (individual and group behavior); sociology; operotions reseorch; and man-machine relotions.

Engine Undergoes Endurance Testing

Endurance test phase development of a 10hp air-cooled compression ignition engine is under way at the U.S. Army Mobility Equipment Reseorch and Development Center, Fort Belvoir, Vo.

The test model is the first of o 2-member family designed to have better life ond reliability characteristics than comparable spark ignition engines. In design ond experimental model tests, it demonstrated thot performance goals can be achieved.

The 10hp engine is 19 × 28 × 22 inches and weighs 200 pounds. The second member plonned for development is a 20hp engine, which will be six inches longer and weigh 60 pounds more.

The diesel engines ore designed to be physicolly ond functionally interchongeable with the militory standord 10 to 20hp gasoline engines. Hercules Division of White Engine, Inc., in Canton, Ohio, holds a $1.6 million contract for the development work.

Testing of Open-Cycle Fuel Cell Scheduled

Militory potentiol testing of an open-cycle fuel cell under development os a field electric power source is scheduled this yeor at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Vo.

A 1.5kw breadboard model has operated for more thon 150 hours to demonstrote o multifuel capability. Indicoted olso were better reliability ond fuel economy, lower noise level, ond less mointenance requirements than engine generators with similar physicol ond performance chorocteristics.

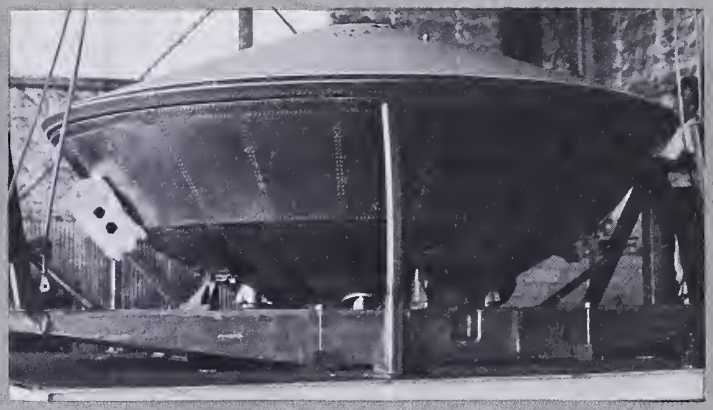
The open-cycle fuel cell is bosed on a regenerative thermol cracking hydrogen generator ond cothode air-cooled phosphoric acid fuel cell stack. If the prototype testing proves cost effective, the fuel cell would replace initiolly the engine generators in front-line applications, ond eventuolly all small models, up to 5kw.

FDA Proposing Revised Tests on Detergents

Testing procedures oimed ot determining more accurately what household substances ore dongerous to the eyes are being proposed by the Food ond Drug Administrotion (FDA).

The proposal is that two groups of rabbits be exposed to the test substonces, such as detergents, for different periods of time—one for 5 minutes and the other for 24 hours—to determine the degree of eye damage. The old test requires only one group of test animols to be exposed for 24 hours.

Charles C. Edwords, MD, FDA Commissioner, said the revised method will be of greoter ossistance in resolving situotions where borderline irritotion ond possibility of permonent eye domoge ore issues.



VIKING TEST VEHICLE shown here in the work area at Roswell, N. Mex., is being prepared for balloon launch for the National Aeronautics and Space Administration. The Viking decelerator system will be checked in a thin-earth atmosphere over White Sands (N. Mex.) Missile Range, simulating conditions expected in the Mars unmanned landing scheduled for 1976.

Air Pollutant Sensing System Developed

A unique method of sensing and monitoring a wide ronge of air pollutants has been developed by three Edgewood (Md.) Arsenol scientists in colloboration with on industrial reseorch group.

Called the "Remote Raman Technique," the system is a form of chemical radar which uses an ultraviolet loser to stimulate emission from airborne compounds and then monitors the emitted frequencies for identification ond analysis.

The system employs a doubled ruby loser beom operating at 3472 ongstrom units (o minute length meosurement) ond o 36-inch diometer optical collecting system.

According to one of the developers, the Ramon technique offers an unusual capobility for remote monitoring of a wide range of air pollutonts.

The Edgewood scientists ore: Harvey Tannenbaum, David L. Tanenbaum and Harry P. DeLong. They worked closely with scientists at Block Engineering Inc., Cambridge, Mass., in developing this sensing and monitoring system.

USACSC Given Additional Mission in Germany

Responsibility for providing software, programing, instollation, ond mointenance support to the V ond VII Army Corps in Germony has been added to the mission of the U.S. Army Computer Systems Commond (USACSC) Support Group in Europe.

Similor support, plus design is being extended to HQ Transportation Commond and focilities ot Bremerhoven, Rotterdom and Kaiserslouten.

Coupled with other actions being taken, the chonges enobled the Commonder-in-Chief, U.S. Army, Europe to inactivate the USAREUR Monogement Informotion Systems Support Agency (MISSA). This oction coincides with policy to develop ond field oll worldwide multicommond ADP systems from one design element, the U.S. Army Computer Systems Command.

MICOM to Evaluate UK Air Defense System

A United Kingdom air defense system is scheduled for evaluation by the Army Missile Command, Redstone Arsenal, Alo.

The weapon, termed Rapier, is a low-level, forward-areo system designed for aircroft defense. Tracking exercises, environmentol studies ond rough terroin tests are currently scheduled.

Prior to evaluotion ot Redstone Arsenal, initial tests are sloted for Fort Bliss, Tex. British military operators ond maintenonce personnel will demonstrote the system and provide occumuloted doto.

Heoding the evoluotion is Edword B. Dobbins of the Missile Commond's Research, Development, Engineering and Missile Systems Laboratory.

Pentagon Facility Links Computer Systems to Data Banks

Three computer terminals linked to separate data banks and networks are providing high-speed response to queries for information related to Army research and development management decisions or project officer responsibilities in a new Pentagon facility.

Army Chief of Research and Development LTG William C. Gribble Jr. cut the ribbon that signified the opening of the facility July 12 in a brief ceremony in Pentagon Rooms 3C359-61.

General Gribble and his staff now have direct access to the Army R&D Information Systems (ARDIS) data banks residing on the Univac 1108 computer of the Defense Documentation Center (DDC), Cameron Station, Va.; the IBM 360 computer in the basement of the Pentagon operated by the U.S. Army Management Systems Support Agency (USAMSSA); and the RCA Spectra 70-61, operated under contract at Cherry Hill, N.J.

The Pentagon facility may properly be considered the goal established a decade ago—in May 1962—by General Dwight E. Beach, then the Army Chief of R&D, when he called for the formation of an ad hoc information group of all major Army R&D agencies.

The formidable task he assigned was to study in depth the feasibility of setting up an automated, coordinated scientific and technical information system that would be responsive to top managers of Army R&D, staff officers with project monitorship responsibilities, and scientists and engineers working at the bench level. As a result, the Army commenced a pioneering role in a cooperative effort to develop the R&D community-wide system.

In October 1962 the group convened at the Army Research Office for a series of daily meetings, culminating information of working groups in 23 identifiable task areas of prime effort. Historically, that was the beginning of top Army emphasis in coping with the problems of automating the collection, storage and retrieval procedures associated with scientific and technical information.

The final phase of the effort, creating an on-line ARDIS retrieval facility at the Pentagon, began in August 1971. This followed closely the experimental prototype facility established in the Highland Building, headquarters of ARDIS.

The new Pentagon facility is housed within a radio frequency shielded enclosure to enable the handling of classified information. A Uniscope 100 cathode ray tube terminal and printer is linked with the Univac computer, an IBM 2265 display station is tied into the IBM 360 computer, and a teletype ASR-37 is connected with the RCA Spectra 70-46.

ARMY CHIEF OF R&D LTG William C. Gribble Jr. cuts ribbon to signify opening of an on-line Army R&D Information Systems (ARDIS) facility in the Pentagon. He is flanked by COL Robert E. Lazzell, chief of Information Systems, and LTC James E. McMurrer, chief, Management Information Division, ARDIS Office, Office of the Chief of R&D.

Immediate response is provided to most queries for requirements information relative to CDOGs (Combat Development Objectives Guide references) and development, test and evaluation milestone performance data. The system is designed to provide resources allocation data as well as other type of management information to the OCRD staff and materiel development agencies.

The total system of management, scientific and technical information, available by "finger tip control" through the Pentagon terminals, involves data generated throughout the entire Army R&D community. This includes the U.S. Army Materiel Command, the Combat Developments Command, the Army Security Agency, Office of The Surgeon General, Office of the Chief of Engineers, the Computer Systems Command, the Army Research Office and other sources.

Actually, the system ties together Army, Navy, Air Force, and Department of Defense scientific and technical information terminals from coast to coast.

The Navy, for example, has established terminal facilities at the Naval

CHIEF OF INFORMATION SYSTEMS COL Robert E. Lazzell views operation of Uniscope 100 remote terminal station, searching for scientific and technical data utilized in management needs. A printer records the information which is stored in a computer at the Defense Documentation Center, Cameron Station, Va. Seated is the financial and contracts manager David Nemore, while computer systems analyst John F. Day checks the procedure. All are members of the U.S. Army R&D Information Systems Office.

Research Laboratories in the Washington Area (White Oak, Md. and Carderock, Md.) and its new data facility at Crystal City in Washington as well as China Lake, Calif. Air Force terminal centers are located at Wright Patterson Air Force Base, Dayton, Ohio, and Albuquerque, N.M.

The Army facility provides access to detailed RDTE planning, ongoing work and performance information, including milestone, financial, and executive level data—broken down by quarters and years. The USAMSSA data bank contains financial and other management data relative to research, development, test and evaluation. The Defense Documentation Center is the central repository for scientific and technical information.

The RCA time-sharing computer system, under contract through Applied Data Research, is accessed through a terminal adjacent to the shielded enclosure. This system furnishes unclassified information on new, changed, or terminated research work in specific interest areas. Correlation of projects and requirements with their priorities is served as well.

Safeguards to protect classified information during transmission are intricate. From the terminal, the inquiries are encrypted for transmission over dedicated Bell Telephone lines to the appropriate computer facility where the electronic signals are decrypted and processed. Replies back to the terminal site follow a reverse procedure. In addition, personnel access to the facility is controlled.

Plans provide for the continued enhancement of the capabilities of the facility. User guides, operator manuals and related training aides are available, though the terminals are quite simple to operate.

COL Robert E. Lazzell, OCRD Chief of Information Systems, in recognizing the efforts of the facility project team headed by John F. Day, emphasized that this success was made possible through support provided by many defense agencies and individuals.

Primary among those outside OCRD, noted by COL Lazzell, are: The Honorable Robert L. Johnson, Assistant Secretary of the Army (Research and Development); Richard L. Saintsing, Deputy Assistant Secretary of the Army (Financial Management); Walter C. Christensen, Defense Director of Technical Information; MG Robert L. Fair, Army Director of Management Information Systems; and

Dr. Robert B. Stegmaier Jr., administrator of the Defense Documentation Center; Morton Marks, director of USAMSSA; Richard G. Bruner, executive director of Technical and Logistics Services, Defense Supply Agency; Charles Putnam, engineering superintendent, Construction and Design Division, General Services Administration; John Bodner, communication security engineer, U.S. Army Communications—Electronics Engineering Installation Agency; Dominic Ciango, director, Space Management Service, Office Secretary of the Army; Francis T. Martin, building manager, Pentagon Field Office.

COL Lazzell said many others played a part, all indicative of the many facets and interests involved in bringing such a complex undertaking to fruition.

Environmental Health Medical Unit Activated

Activation of the U.S. Army Medical Environmental Engineering Research Unit (USAMEERU), consisting of 20 members under the command of MAJ Charles A. Sorber, Medical Service Corps, is scheduled to take place July 1.

In support of the Army Surgeon General's responsibility in air and water pollution control, and solid waste and pesticide disposal, the unit will conduct continuing environmental health engineering research.

USAMEERU will not duplicate work being done at any existing facilities under Army control but will utilize the in-house research capabilities of the Edgewood (Md.) Arsenal area at Aberdeen Proving Ground. Only two of the 20 military and civilian personnel are not qualified in the scientific and engineering fields.

Some of the areas in which the unit will be involved are:

- Health and hygiene projects concerned with land disposal of waste water.
- Evaluation of field test kits to ascertain the amount of free available chlorine in water.
- Evaluation of environmental health hazards created by the disposal of pesticides and their containers.
- Development of improved technology related to air quality surveys for use by the U.S. Army Environmental Hygiene Agency (USAEHA).

USAMEERU will report directly to the U.S. Army Medical Research and Development Command in Washington, D.C. USAEHA functions under the Office of the Surgeon General, or the Research Laboratories of Edgewood Arsenal and the U.S. Army Munitions Command at Dover, N.J.

CHECKING WATER SAMPLES at newly formed U.S. Army Medical Environmental Engineering Research Unit are CPT Kurt J. Guter (center), project officer for field test kits; 1LT William J. Colper (seated); and PFC John C. Camp, a chemist on loan from the U.S. Army Environmental Hygiene Agency, Edgewood Arsenal.

Newsmagazine Milestone Marked With This Issue

With this edition, the *Army Research and Development Newsmagazine* marks another milestone on its time-phased progress toward completion of a "face-lifting" in CY 1972 to improve its readability and appearance.

Resumption of monthly editions with this issue was scheduled also to be marked by the use of limited color on a maximum of 16 inside pages, in addition to the cover, and by the use of litho-coated paper to achieve improved reproduction of pictures. The request for authorization to make these changes is still pending before The Army Adjutant General.

Return to regular monthly editions means that firm scheduling is essential at all echelons of the production cycle, and that the packet of text material and illustrations for each edition be submitted to the printer not later than the 14th of each month, to meet terms of the contract.

Consequently, feature-length articles should be submitted through command channels to arrive at the *Army Research and Development Newsmagazine* office fully two months or more in advance of the month of publication. An article for the October edition, for example, should reach the editors not later than the first of August.

Timely news items, the so-called "spot" news, must be received by the first of the month preceding the date of issue, that is, by the first of September for the October edition. Occasionally, a truly "hot news" item can be accepted as late as five days before the edition goes to press. Coordination in advance by telephone will facilitate this exception. The telephone numbers are 692-7338 or 27339 or 21480 (use these as extension numbers with Autovon dialing).

Encouraged also is a telephone call to the editors to ascertain in advance the expected degree of interest in feature articles or news items considered of special significance. This will ease scheduling problems.

In addition to a substantially increased flow of quality feature articles and news items of importance to the Army R&D community and federal agencies having a related interest, the editors are asking for the aid of all information officers and laboratory key officials in providing schematics or pictures with the maximum dramatic appeal—particularly drawings or charts with impact.

Color pictures or sketches deserving of consideration for the front, back and inside covers of the Newsmagazine will be a continuing need. These must be pictures or sketches of new items of military materiel, advanced technology or facilities which are addressed in a feature article.

COMPUTER-AGE SERVICES OF DDC . . .

Data and services of the Defense Documentation Center provide R&D activities essential support in their work

Providing up-to-date research and development data from a vast repository to about 3,700 organizations on a rapid-response basis is a rather amazing feat performed routinely by the Defense Documentation Center (DDC).

Located in a modernized facility at Cameron Station, Alexandria, Va., DDC combines the wizardry of the most advanced computers with a cathode ray tube network, magnetic tapes, automated microfiche, and other sophisticated information processing techniques to ease a difficult task.

More than one million R&D documents compiled since World War II are stored principally in miniaturized form, for high-speed search, retrieval and display to satisfy requirements of Department of Defense agencies and their contractors. A certified need-to-know for classified information is required.

Data related to thousands of ongoing projects of the Military Departments can be provided in most instances with satisfying responsiveness to exactingly precise requirements. DDC processes an average of 2,500 requests daily for documents or related information stored in four data banks: Technical Reports; Program Planning; Work Unit Information Summary; and Independent R&D Data.

Functioning as one of 25 primary-level field activities of the Defense Supply Agency (DSA), DDC is the central facility within the Department of Defense for processing reports on DoD-sponsored research, development, test and evaluation (RDT&E) activities. In addition, current information is received on a current basis in the form of Work Unit Information Summary reports.

TRIPLE-PURPOSE camera stand allows DDC operator to photograph documents on 35mm roll film and in 4 × 6″ microfiche, reduced 24:1, and to place a legible "header" on each microfiche through a specially designed optical arrangement.

DDC Administrator Dr. Robert B. Stegmaier Jr. holds a roll of microfilm that contains 10 issues of Technical Abstract Bulletin. On table is microfiche copy of a single issue.

Another DDC responsibility is that of designing and developing new or improved technical documentation systems, services and products.

Recently, DDC made operational the 14 remote terminal installations that had been experimental for on-line retrieval of information from its central automatic data processing system. Scattered throughout the United States, the terminals are electronic extensions of the DDC on-line computer system.

Using cathode ray keyboard consoles, terminal operators can hold "conversations" with computers at DDC, even while DDC's employes busily utilize the same computers for other data processing tasks.

With only a few minutes at the console, the remote user is able to ask for certain information and receive a reply. The user is "led" through the data retrieval process by the screen display on the cathode ray tube as he searches for specific information.

"The advantage of this system," explained Dr. Robert B. Stegmaier Jr., DDC Administrator, "is that it provides a shortcut in both time and processing steps to take care of users' requests."

POWER FILES operated by push-button control enable an operator to bring into reach in seconds any of 24 drawers containing microfiche copies of scientific and technical documents. DDC has seven of these power files, each of which can accommodate about 120,000 documents.

Whereas the conventional method of obtaining data from DDC takes eight steps that may require from one to four days, this on-line system consists of four that can be completed in one to two minutes. They are: The user formulates the search pattern and types it into the console. The typed information transmitted to the central computer also shows on the screen. The computer makes the search. The user reviews the results displayed. If he likes what he sees on the screen, the user can push a button on an adjacent unit and get a paper copy of what is displayed.

Provided results displayed are not what he wants, the user can recycle the search, using another pattern. This is like browsing in a library, looking at different books until the right one is found.

In a search that involves many "finds," the user keys in instructions to the computer to make a "batch run" during the night-time schedule set aside for this purpose. Instead of having what may amount to many yards of copy tapped out on his local printer, the user requesting a batch run gets a DDC printout, cut, assembled and stapled.

While DDC has long served as a repository of DoD-originated technical reports, and has consistently provided various other products and services, one of its primary roles today is the development of scientific and technical information products and systems. The DDC recently instituted several new services for its customers.

One program produced the "Defense R&D of the 1960s" on 16mm microfilm. This was done by processing magnetic tapes containing 400,119 document citations, sorting and merging them, and then running them through a Computer-Output-Microfilm photocomposition processor to make a master 16mm film, from which copies are made.

Compiling this searchable shelf-list of all DDC accessions over the 10-year period is believed to be the largest variety of research documents ever packaged this way. "Defense R&D of the 1970s" is now being compiled on a year-to-year basis.

Another change is the reduction ratio in 4 × 6 microfiche. Formerly produced with a maximum of 60 images, each microfiche now contains up to 98 frames (images) and a title area. The new format was adopted as the U.S. standard for scientific and technical reports by the Federal Council for Science and Technology. The shift in ratio from 20:1 to 24:1 conforms with National Microfilm Association standards.

When a DDC user today activates any one of the several on-line cathode ray tube remote inquiry devices, he has one problem: asking the computer to search for words it recognizes. Someday he may be able to take advantage of DDC-developed Machine-Aided Indexing (MAI) and the Natural Language Data Base (NLDB).

Through MAI, terms are being assembled out of actual texts into more than 60 alphabetical patterns, each of which has one or more prearranged word combinations. This procedure seeks to discover, by computer analysis of textual materials, the words and phrases human beings use to describe reports.

Then, when anyone interrogates the system, using any term that happens to match one or more of the machine-assembled terms, a "hit" occurs. This is a result of the user's asking in his own free language for words and phrases *he* would use.

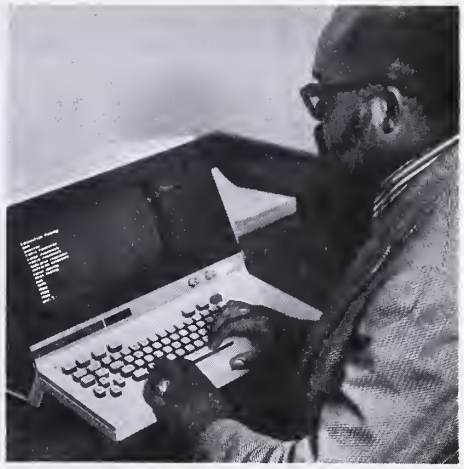
Presumably, these will in many cases be the same words and phrases the authors have used and which have been picked up by the MAI program as retrieval terms.

The DDC computer used in this program can "chew" through one million words of text in an hour, or a 300-word abstract in one second.

Plans at DDC call for MAI to be expanded and refined and new ways devised for utilizing NLDB as a retrieval tool. New data bases are also being subjected to analysis to give the format dictionary a better "feel" for the natural language in all fields of Defense R&D studies.

Looking still further into the future, DDC officials say that "someday users will talk to our computer just the way they would to a colleague, and the machine will respond in microseconds."

According to this forecast, the machine will say, in effect: "Here is a citation of all the documents you have asked for. If you like what you see, simply key in your User Code and order the documents you want. If you do not like the 'hits,' please try some new words on me."



CATHODE RAY TUBE remote installation, one of 14 with direct access to the DDC central computer facility in Alexandria, Va., gives a user the capability of querying the system about documents or work unit information summaries.

Notwithstanding this 21st Century possibility, DDC already provides its customers a number of additional up-to-date services. Following a "push" concept, DDC furnishes documents to organizations even before they know of their existence. It works this way.

DDC users wishing to receive regular shipments of microfiche copies of documents in selected subject areas can register with the Automatic Document Distribution (ADD) program. An experimental project until recently, ADD is

(Continued on page 8)

THIN-FILM MEMORY computer operates 22 hours a day at DDC to handle in-house information storage and retrieval operations as well as 14 network remote terminals.

COMPUTER-AGE SERVICES OF DDC . . .

(Continued from page 7)

designed to anticipate a user's needs by matching, twice a month, his subject-interest "profile" against the computer data bank of newly accessioned documents. This program became operational last July.

The objective is to ship microfiche copies of documents to ADD-registrants at approximately the same time they are announced in the DDC Technical Abstract Bulletin (TAB).

TAB, a twice-monthly publication, announces both classified and unclassified limited-access reports as they are received and stored at DDC. In addition to the bulletin, indexes are published and distributed to using organizations. These are issued by subject, personal author, corporate author-monitoring agency, contract, report number, and release authority.

Currently, DDC is announcing more than 3,000 new reports a month, and filling requests for copies at the average rate of 1,200 each workday. Bibliographic compilations are being provided to users at the rate of nearly 100 a day.

DDC also identifies reports for which numbers are not known, and provides referral services to various information points, including the 26 DoD Information Analysis Centers.

A vast compilation of information about research and technology (R&T) programs in DoD is in being at DDC, and is growing daily. At the latest count, more than 19,000 active resumes of R&T work units were in the DDC data banks.

Updating actions to keep the work unit data bank current occur several hundred times each working day. Resumes are availabe to managers, scientists and engineers who need to know what is currently being done in Defense R&T activities.

Contractors, too, can receive newly updated status reports on R&T work units. By interrogating the Work Unit Information Summary data bank, managers can identify ongoing efforts. Scientists and engineers can determine the approach and current status of technical efforts related to their own tasks. High-level government offices can avoid duplication of programs in planning for and inaugurating new projects.

DDC also maintains data banks for the Contractor Performance Evaluations (CPE) program, which is extensively used by U.S. Government procurement personnel to assure that the taxpayer gets full value from his tax dollar.

DDC had its origin in July 1945 when tons of captured German and Japanese technical documents were added to the mass of U.S. R&D reports generated in World War II. To systematize this collection, the Army Air Force established an Air Documents Division within the Air Materiel Command Intelligence Department. In 1947, the Air Force and the Navy combined to form the Central Air Documents Office (CADO). In 1950, the Army became a participant.

Secretary of Defense George C. Marshall, on May 14, 1951, established the Armed Services Technical Information Agency (ASTIA) to serve all three Military Departments and their contractors. CADO and the Navy Research Section of the Library of Congress were incorporated to form ASTIA.

ASTIA continued until March 1963 when the agency was reconstituted as DDC. At that time the collection comprised 700,000 different titles and the annual requests for documents totaled more than one million. DDC's function was transferred from the Air Force to DSA in November 1963.

Currently, DDC has more than one million documents, is adding to the collection at the rate of 750 per week, and distributes 450,000 classified and limited-distribution reports per year. It serves, in about equal proportions, both government agencies and their contractors.

Under the Freedom of Information Act, unclassified defense documents that can be released to the public are turned over to the Department of Commerce's National Technical Information Service in nearby Springfield, Va. The NTIS is therefore the "Sales Office" for these R&D documents, for both the general public and DDC's own registered users.

While requesting agencies receive responses quickly in the form of hard (paper) copy, 35mm roll microfilm, or microfiche, perhaps little thought is given to the human element involved in DDC's operation.

Giving life and expertise to the remarkable computerization processes at DDC are professionals such as document analysts, lexicographers, bibliographers, physical scientists, editors, cataloguers, reprography specialists, indexers, verifiers, microxerographers, technical information specialists, systems analysts, computer specialists, and a number of other individuals highly skilled in scientific and technical fields.

The expertise of the 460-plus employes in DDC is reflected daily in Dr. Stegmaier's opinion, by the comprehensive and competent services provided by DDC to research scientists, engineers and others serving the U.S. Government's RDT&E activities.

VALUE ENGINEERING STUDIES continue to account for substantial savings in funds at Picatinny Arsenal, Dover, N.J. Pictured at right, Archie Scigliano, project engineer, and Mrs. Patricia Abrams, Safeguard Engineering Division, initiated a study to develop a single Warhead Section Continuity Tester. Designed for use with Sprint and Spartan missile systems, and resulting in elimination of separate testers, the VE product saved an estimated $92,000 in development and production funds. Below, Robert Miller and Peter Skerchock, Munitions Engineering Division, introduced a less expensive primer than that formerly used to coat M117-series bomb casings, resulting in $70,400 savings in FY 72

Fort Belvoir Center Marks 30 Years of Army R&D

Few Army research and development organizations can trace their history further, or take more pride in it, than what is now the U.S. Army Mobility Equipment R&D Center which, if you count its predecessors, marks its 30th anniversary at Fort Belvoir, Va., July 1.

In the parlance of the modern Army, mobility is the name of the game, or as phrased by General Nathan B. Forrest in the Civil War "get there first with the most men"—and methods of doing that are primarily, though far from being all, the MERDC's mission.

Currently, the nearly 1,400 MERDC employes include some 500 scientists and engineers in addition to technicians and support personnel. They are concerned principally with conceiving, engineering, developing and carrying into prototype production the kinds of vehicles needed by a fast-moving combination of combat forces.

Methodology and the means of modern land warfare, however, involve much more than vehicles. That explains why MERDC researchers are charged with responsibilities in mine detection and neutralization, intrusion detectors, barriers, camouflage and deception, electric power generation, bridges and structures, marine craft, construction equipment, fuels handling, materials and cargo handling, water purification, environmental control, materials research, etc.

Before the center's Topographic Department of what was then the U.S. Army Engineers Research and Development Laboratories (ERDL) became, in August 1960, the Engineer Topographic Laboratories, the ERDL had the Army-wide responsibility for R&D in surveying, mapping and geodesy.

Similarly, the ERDL, which in 1967 was redesignated the MERDC, had a primary role for R&D of night-vision devices until November 1965, when the Night Vision Laboratories of the Electronics Command were formed from its Warfare Vision Division. However, both of these organizations, the ETL and the NVL, are part of the MERDC complex and are supported by it as tenants.

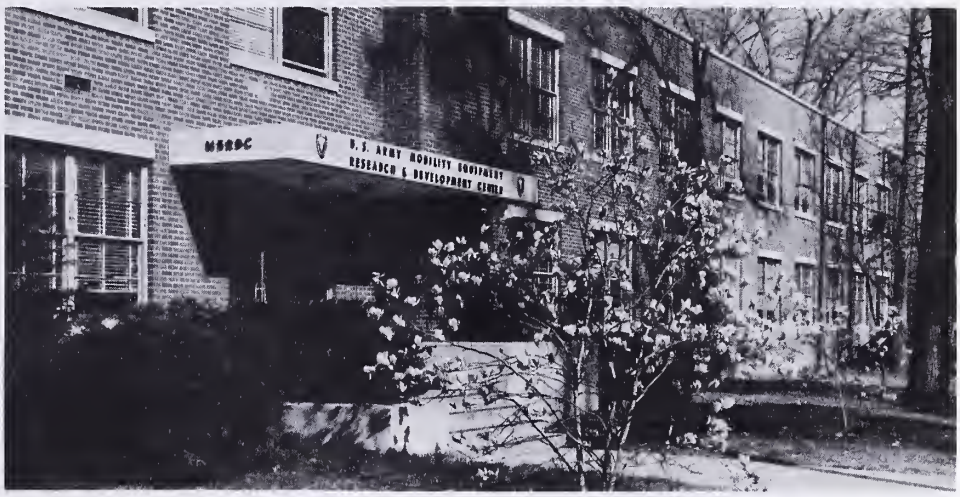
MERDC can trace its descent from a series of special boards of officers established by the Corps of Engineers as far back as 1870 for the development and modification of military equipment.

The mission of an Engineer Board at Willets Point, N.Y., now Fort Totten, at that time was to test all new items of equipment. This board transferred to Washington Barracks, D.C., about 1900 and in 1920 was dissolved.

In 1921 its place was taken by the Board on Engineer Equipment set up at Camp Humphreys, Va., now Fort Belvoir. Bee was the forerunner of the Engineer Board which, from 1933 to 1947, was the guiding hand of military R&D activities of the Corps of Engineers.

In June of 1942, about 450 military and civilian personnel were involved in the move of the buildings opposite Belvoir's Wallace Theater to the present site of MERDC, where 20 newly constructed buildings awaited.

The move was a major milestone for the Corps of Engineers, consolidating not only R&D but troop testing, and even prototype fabrication. Five years later the name of the board was changed to the Engineer Research and Development Laboratories (ERDL).



MERDC HQ Building, 1972, as center observes 30th anniversary at Fort Belvoir, Va.

In 1962 the laboratories became part of the Army Materiel Command—first with the now-dissolved Mobility Command in Detroit, and two years later with the Mobility Equipment Command (MECOM) in St. Louis, Mo.

Commanded by COL Bennett L. Lewis, who also heads the MECOM R&D Directorate, MERDC has an important role in filling the command's global logistical responsibility for management of the Army's materiel transportation and handling equipment, troop support equipment, power generating equipment, field support equipment, and construction equipment.

Under MECOM, the MERDC mission also has been broadened to include tasks from other former Technical Services, such as the Quartermaster and Transportation Corps. The tasks include petroleum handling and dispensing equipment, materials handling equipment, and amphibious, rail, and marine mobility materiel.

In 1954 the ERDL Roads and Airfields Division went to Waterways Experiment Station at Vicksburg, Miss., the Basic Research Laboratory moved to Picatinny Arsenal in 1967 after 11 years of exploring the nature of explosives at Belvoir.

The Electromagnetic Effects Laboratory was transferred, in July 1971, to a former STRATCOM site in Woodbridge, Va. Now reporting to Harry Diamond Laboratories, as part of a consolidation of Army Nuclear Weapons Effects activities in HDL as a Lead Laboratory in this field, EME continues to avail itself of the MERDC test facilities.

MERDC's four technical departments are: Countermine/Counter Intrusion, Electrotechnology, Mechanical Technology, and Military Technology. Their aim is the development and modernization of mobility support equipment which not only is suited for operation worldwide, but also, in an era of reduced defense budgets, emphasizes simplicity, reduced costs, reliability, maintainability, reduced vulnerability and reduced operator requirements.

Among current developments are a new tactical float bridge, called the ribbon bridge; helicopter-transportable earth-moving equipment; fuel cells as silent power sources for forward area combat operations; a 10kw turboalternator; thermoelectric and other revolutionary air conditioners; more reliable and lighter mine detectors; and tunnel detectors.

Additional areas of effort include a variety of personnel detectors and sensors; a mine-clearing plow; fuel-air explosives and other mine neutralization techniques; new obstacles to impede the enemy; a "reverse osmosis" purifier that may provide a compact, mobile means of removing CBR agents and dissolved minerals from water; special camouflage equipment; and techniques and improved materials handling equipment.

Benefits of the center's R&D efforts have not been solely military over the years. A prime example is water purification equipment that can turn out purified water from the most polluted of rivers and streams. This has been pressed into service in flood and earthquake disaster areas throughout the Western Hemisphere.

Today, the center's investigations of treatment of wastes from military operations and of the removal of pollutants from engine and vehicle exhaust play an important role in the Army ecology program.

Physical boundaries of the MERDC are the same now as they were 30 years ago. In the center-tenant complex, the number of buildings has increased to 110, including 42 of permanent construction. The newest, a Countermine/Counter-Intrusion Laboratory, is slated for completion shortly.

The 82-acre MERDC Annex, five miles distant, still is devoted primarily to design testing of construction equipment. It includes facilities for mine warfare, demolition, night vision, and electromagnetic pulse effects research. A 2-story brick building is under construction as a barrier field experimental facility.

The Annex was originally part of a purchase of land to the north of Fort Belvoir made by the Corps of Engineers in 1941, known originally as EeBee Field with an airstrip capable of landing a C-47. During the 1950s it was known as the Engineer Proving Ground, becoming the Annex in December 1963.

Photos by Ira S. Lerner (c) National Geographic Society

STARLIGHT SCOPE was used recently by Patricia Des Roses Moehlman, a graduate student of the University of Wisconsin's Zoology Department, to study the habits and life styles of the burros of Death Valley, Nev., for their impact on the environment.

Night Vision Devices . . .

Developed for combat operations under darkness proving valuable for peaceful research projects.

Night-vision technology developed by the U.S. Army to meet an urgent need of combat forces in Southeast Asia is earning its place as one of the products of war being applied increasingly to the peacetime "service of man."

This technology began to emerge in the early 1960s, but it was not until 1968 that the Army's new family of tactical viewing equipment developed by the Army Electronics Command's Night Vision Laboratory was unveiled.

Army image intensification devices have since then yielded numerous successes in combat, in the fields of science, in law enforcement and in various safety applications. Daily, the list of civilian uses of such devices is lengthening rapidly.

In the Everglades National Forests in Florida, the chief ranger used the Army's Small Starlight Scope to apprehend alligator poachers. The Department of Wildlife Ecology at the University of Wisconsin found this scope effective for research on the life, history and ecology of animals at night.

One of the most recent studies in which use of the Starlight Scope was rewardingly employed was conducted in Death Valley, Nev., as reported in the April 1972 *National Geographic Magazine.*

A young graduate student, Patricia Des Roses Moehlman, from the University of Wisconsin's Zoology Department was attempting to determine whether the famed burros of Death Valley were posing a threat to the balance of nature in that region.

Some ecologists contended that the burros' presence would alter nature's delicate scales, since they are not indigenous to Death Valley. Miss Moehlman lived in the desert and studied habits and life styles of the animals. Her determination was that the burros pose no threat to the environment and should not be removed.

Another attempt to come to a closer understanding of nature by using night-vision aids was carried out by two scientists of the U.S. Department of Interior's Northern Prairie Wildlife Research Center in Jamestown, N.D. George Swanson and Alan Sargeant used the Crew Served Weapon Sight (AN/TVS-2) to study the night-time feeding behavior of ducks.

Feeding behavior, they discovered, was greatly influenced by the emergence pattern of midges (Chironomidae) and mayflies (Ephemeroptera) on wetlands. Their report states "this feeding activity . . . was not observed on adjacent wetlands where invertebrates were not active at the water surface."

Another of their study observations is that hens appeared to be less reluctant to take their broods into open water at night. Swanson and Sargeant credit the electronic night eyes with deriving much previously unknown information, saying:

"Use of the night-vision scope has provided a new insight into the feeding ecology of prairie ducks and should prove valuable for other studies of nocturnal animal behavior."

Department of Interior researchers proved they were quite correct in their foresight concerning the use of night-vision equipment. Prof. R. R. Grien of the University of Washington in Seattle worked with the Department of Commercial Fisheries on a survey of the distribution and abundance of the Pacific Saury, a pelagic fish. The Saury migrate to the surface of the ocean and form schools at night, thus making their covert observation and study possible with the Starlight Scope.

Army Night Vision Laboratory officials at Fort Belvoir, Va., expect that, in numerous ways, the Small Starlight Scope will continue to serve soldiers in the field as well as researchers and scientists throughout the country. Attention, however, is

"In reaching the moon, we saw what miracles American technology is capable of achieving. Now the time has come to move more deliberately toward making full use of that technology here on earth, in harnessing the wonders of science to the service of man."—Richard M. Nixon, State of the Union Address, Jan. 20, 1972.

turning to the potential of another recent breakthrough in night-vision technology.

Thermal imaging, or far infrared, has evolved to the stage where users can observe thermal radiation in "real time" as opposed to the bulky "after the fact" thermal devices of the early 1960s.

The NVL's Handheld Thermal Viewer (AN/PAS-7) was successfully tested by troops in Vietnam as an ambush detector. It achieves this purpose by "penetrating light foliage" that normally would conceal a person or persons. An image is formed by differentiating the temperature difference between the object and its background.

One of the civilian applications suggested for this device, or devices operating under the same principle, is for sea rescue work because a human body surrounded by water will radiate thermal energy at a much higher rate than the cooler water.

The Thermal Viewer already has been employed successfully to study oil paintings and determine their authenticity. The Bureau of Mines has also used a specially modified viewer, AN/PAS-10, to study loose hazardous rock, explosion misfires, and combustion in stockpiles and dumps. The Bureau has broadened application of the PAS-10 by recently awarding a contract to a private firm to redesign the viewer to perform other mine-oriented tasks.

In Mount Vernon, N.Y., police have been using low-level-light television—another development in which the Army Night Vision Laboratory had a pioneering role—to patrol streets having a high crime rate. Parts of this effort will be included in a 30-minute film titled "The Fear Fighters," being readied for release by David Wolther Productions of Los Angeles.

Another hour-long film, "The World of Darkness," is being produced by the same firm. This will show various nocturnal studies of the behavior of animals and is being produced for the National Geographic Society.

One of the scenes will depict how a snake that is blind uses infrared sensors to stalk its prey. The Army Hand-Held Thermal Viewer will be used to photograph a mouse at night, showing essentially what the snake "sees" with the same infrared "sight" as the viewer.

The *Army Research and Development Newsmagazine* has carried a number of articles in recent years on various applications of the night-viewing devices, developed for combat use, to civilian requirements. Perhaps the most significant study reported was on vampire bats in Latin America which are responsible for the death of millions of dollars worth of beef cattle every year.

Other civilian applications for the Army's night-vision equipment are envisioned to serve scientists and researchers as long as the search for new knowledge involves "a need to see the unseen." Night Vision Laboratory leaders believe the parameters of use can be drawn only when man ceases to imagine new applications.

AMSAA Becomes Separate AMC Organization

The U.S. Army Materiel Systems Analysis Agency (AMSAA) at Aberdeen Proving Ground, Md., is now a separate organization of the U.S. Army Materiel Command.

Formerly a unit within the complex of the U.S. Army Aberdeen Research and Development Center (ARDC), AMSAA will continue to receive support from ARDC but will be directly accountable to the AMC.

Founded in 1945, AMSAA's current mission is to provide the central technical capability of AMC for the conduct of major systems analyses of proposed and existing Army weapons/materiel systems, programs and support throughout their life cycle. Technical Director Dr. Joseph Sperrazza heads a staff of 300 employes.

More specifically, AMSAA's mission is:

- To review and analyze pertinent materiel need (MN) documents in order to provide the basis for major decisions concerning concept, design, development, acquisition, employment and support of Army systems and programs.
- To develop, improve and disseminate methods and techniques employed to conduct systems analysis.
- To develop techniques and conduct analyses on the reliability, availability and maintainability aspects of materiel systems.
- To design tests and monitor the AMC life-cycle surveillance for worldwide stocks of nuclear and non-nuclear ammunition and other materiel systems as directed.
- To provide special systems analysis support to AMC major subordinate commands and project/product managers.
- To conduct tactical operations analyses and to establish mission profiles for weapons/materiel systems as needed to support AMC systems analyses.
- To provide professionally qualified personnel to participate in joint systems analysis team efforts.
- To serve as the AMC field agency to administer the Joint Technical Coordinating Group for Munitions Effectiveness.

Report Covers Clustering System Developed as Educational Model

In a new technical report, the Human Resources Research Organization (HumRRO) discusses the "clustering system" it developed as an essential ingredient of the Comprehensive Career Educational Model.

The model, which serves as a planning vehicle for instructional purposes, provides students with information about the "world of work," helps them choose a career, and provides instructional objectives and learning experiences.

Published as TR 72-1, the report is titled "An Occupational Clustering System and Curriculum Implications for the Comprehensive Career Education Model." It was prepared by HumRRO under subcontract to the Center for Vocational and Technical Education of the Ohio State University.

AF Surgeons Perform Successful Body Perfusion

Total replacement of an airman's diseased blood stream, believed the world's first successful operation of this kind on a human patient, was accomplished recently by a team of Air Force surgeons at Wilford Hall USAF Medical Center, San Antonio, Tex.

Air Force Surgeon General (LTG) Alonzo A. Towner announced the "total body perfusion" on a patient suffering complete liver failure and in a hepatitis-induced coma for several days prior to the operation.

Within 24 hours the 20-year-old sergeant responded dramatically, was wide awake, and showed no signs of being damaged by the period he was purged of blood. A saline solution was injected as the original blood was drained so that no air could enter the circulatory system.

The solution, containing albumin and other agents, completely flushed the patient's diseased blood, enabling his liver to regenerate sufficiently to resume its filtering process as fresh blood was pumped into the body by using a heart-lung machine.

During the operation, performed by a team headed by COL (Dr.) Gerald Klebanoff, the patient was in suspended animation—totally bloodless and cooled to about 85° F. for 8 to 10 minutes. This slowing of the body processes protected the brain and vital organs from deterioration.

Bloodless perfusions on dogs were first successfuly performed by the doctors at the University of Mississippi in 1963. Doctors in Virginia performed the procedure on a baboon three years later and the animal survived.

Improved Management:

Industrial Independent R&D Funded by Government Is Utilized More Effectively by MICOM Laboratory

PROGRAM INCREASES CROSS-FERTILIZATION OF IDEAS, CUTS UNWARRANTED DUPLICATION

Utilizing more effectively the U.S. Government's $600 million current annual investment in Industrial Independent Research and Development (IIR&D) is the objective of the U.S. Army Missile Command (MICOM) as the first organization within the Department of Defense to devise and implement such a program.

Operated by the Redstone (Ala.) Arsenal Scientific Information Center, Research, Development, Engineering and Missile Systems Laboratory, this program has enabled MICOM management to be cognizant of technological trends and to incorporate these trends into advanced planning. It has also served as a management aid in guiding contractors and alerting them to the Army's requirements.

Scientists and engineers are able to keep abreast of the latest technological advances in their fields, thus increasing the cross-fertilization of ideas and reducing unwarranted duplication of efforts between industry and federal laboratories.

IIR&D is that research and development funded in part by the U.S. Government but not sponsored by a contract, grant, or other arrangement; funding is in the form of an overhead allowance on government contracts.

Categories for which IIR&D funds may be used are defined as basic research, applied research, concept formulation studies, and product development. All projects funded under IIR&D must have a potential military function.

The program helps the contractors keep a competitive posture while their facilities and manpower are engaged in fulfilling government contracts. Theoretically, it enables the contractor to attract other customers in case the government needs should change.

IIR&D also enables the contractor to maintain a viable research and development capability. By extending the state-of-the-art, it provides a broad technical base from which new weapon systems may evolve.

An example of the benefits derived from the IIR&D program is the foundation work LTV Aerospace Corp. accomplished before offering and receiving the contract for the Lance Missile System. Between 1963 and 1970, LTV developed storable liquid propulsion and a boost velocity cutoff computer, which were later incorporated as unique components into the Lance Missile System.

In addition, LTV studied various improved configurations of the General Support Missile concept. As a result of the research and development conducted under the IIR&D program, the required technology was available when the Army had a requirement for a new weapon system.

MICOM has the responsibility of keeping industry alterted to MICOM needs and future requirements. This can only be accomplished if MICOM is aware of past and present work conducted under the program.

TABLE 1
1971 IR&D Funding
& % of IR&D Efforts
By Missile Technology

Technology Area	% of Funding	Funding
Sensors	31.93	$102,838,254
Graund Support Equipment	24.77	80,116,481
Moteriols	14.50	48,975,136
Inertiol Guidonce & Control	7.13	26,640,425
Propulsion	5.40	21,378,500
Aerodynomics	4.06	17,317,750
Structures & Mechonics	4.02	17,206,500
Systems Concepts & Analysis	3.08	14,345,600
Lasers	2.45	13,441,294
Terminol Homing	1.69	11,132,828
Nucleor Weopon Effects	.54	6,660,000
Experimental Systems	.39	6,185,000
Total		**$366,237,768**

In the past year, approximately $600 million have been funded to about 100 companies or profit centers for IIR&D. Each of these participants is assigned to a branch of service within the Department of Defense which has responsibility for the negotiation of the overhead.

The military services assign the company to a "lead laboratory" for evaluation of the program and coordination of IIR&D activities. At the present time, the Army has responsibility for 18 companies.

One service has primary responsibility for the efforts of a particular contractor, but all services contribute to the technical evaluation of the work, by evaluating technical brochures or participating in on-site reviews.

During 1971, MICOM evaluated, analyzed and added to a computerized data base 9,000 IIR&D tasks from about 126 contractors or profit centers, or 100 percent of the contractors who have signed advance agreements. MICOM has determined that 61 percent was work applicable to missile technology.

Table 1 shows IIR&D funds allocated to the various missile technology areas, and the percentage of the total expended in each missile technology area. The significance of missile specific IIR&D funding makes it imperative that both management and the "man on the bench" utilize the program.

Contractors whose IIR&D and bid and proposal costs totaled more than $2 million the previous year must negotiate an advance agreement which places a ceiling on allowable costs. Since the advance agreement is based upon technical evaluations, these contractors are required to submit an annual brochure describing their IIR&D projects as well as host on-site reviews. The following information must be included in the brochure project descriptions: Title, planned expenditures, period of time the project has been active, principal investigator and his qualifications, man-years involved, objective, technical approach, and past achievements.

The responsibilities of each Army Materiel Command (AMC) major subordinate command and each laboratory include the following:

- Making evaluations of the proposed program in the organization technical area from the brochures.
- Designating an IIR&D point of contact within the organization.
- Receiving and distributing brochures within the organization.
- Maintaining a file of brochures for the current and previous year.
- Evaluation includes a review of accomplishments of the prior year IIR&D program.
- Supplying attendees to on-site reviews conducted by other installations.
- Conducting on-site reviews at contractor facilities over which they have responsibility.
- Assuring awareness of the results of the IIR&D program.

All of the above responsibilities are carried out without difficulty except the last. Each command receives a limited number of brochures for evaluation (usually two). IIR&D efforts appear only in the form of an indexless brochure (no technical reports are required) which may contain up to 200 tasks. Covered are such broad areas as computer sciences, sensors, electronics, aerodynamics, ordnance and navigation. Consequently, the problem of assuring that government employes review the projects in their particular technical area arises.

Usually after evaluation by one or two people, the brochures are filed away. Because of the difficulty in retrieving information from the brochures, they are used only when someone has received a "lead" that certain work is being done by a particular contractor.

In an effort to solve the problem of assuring awareness of IIR&D programs to both management and the "man on the bench," MICOM devised a scheme consisting of a current awareness program and retrospective searching capability. This was the first attempt to provide an automated data bank and selectively disseminate IIR&D data for current awareness within the Department of Defense.

MICOM's CURRENT AWARENESS PROGRAM is working well in the Research, Development, Engineering and Missile Systems Laboratory. Its implementation is assuring that individuals engaged in R&D activities remain informed of IIR&D efforts in their particular technology areas.

To accomplish this, the system of selective dissemination of information (SDI) has been very satisfactory. Each month each organizational element receives a computer printout listing only those IIR&D projects which have been indexed in their areas of technology that month.

The computer printout lists each project on the IIR&D brochures. The following data elements are given for each project: COSATI Code, Accession Number, Corporate Source, Title, Principal Investigator, Corporate Project No., Funding, Task Location, Years of Progress, Brochure Pagination, and Keywords.

As brochures are received from the contractors, throughout the year, an accession number composed of eight spaces is assigned to each project within the brochure. The first two spaces represent the fiscal year; the third space is the symbol for the branch of service responsible for the contractor's IIR&D work ("A"—Army, "F"—Air Force, "N"—Navy, and "D"—Defense Supply Agency); the last space is the project number.

After accessioning, the brochures are assigned to a professional indexer with training in a technical field who uses a standard MICOM work sheet form.

The COSATI Code Number, assigned by the indexer, is an 8-digit numerical code designating the subject category in which the project falls. A sample listing of the COSATI Codes and a breakdown by field, group section and unit are given in Figure 1.

Keywords are chosen by the indexer after the project description has been studied and analyzed. The authorities for keyword selection are the "Thesaurus for Engineering and Scientific Terms," published by the Department of Defense, and a supplemental list of missile terms needed for in-depth indexing.

An interest profile has been devised for each organizational element participating in the SDI program, consisting of COSATI Codes for those subject areas relating the organization's mission and functions. A sample of interest profiles for MICOM organizations is given in Figure 2. The monthly computer printout lists only the projects with COSATI Codes that match the interest profiles of the organizational element to which it is sent.

RETROSPECTIVE SEARCHING. In addition to the current awareness aspects of the program, a data base of projects for current and previous years is maintained, so that retrospective searching may be accomplished. Any time a search by COSATI Code, keyword, or corporate source is requested, it may be done on the entire data base. Boolean equations linking keywords together may also be used.

The retrospective searching is used especially during the MICOM Planning, Programing, and Budgeting Systems (PPBS) cycle. Each proposed task is checked with the IIR&D Data Bank and certified that no duplication of effort exists. If duplication does exist, it must be justified on the basis of verification. In this way, management is assured that RDT&E funds are not being used for work already funded in the IIR&D program.

In summary, MICOM's Current Awareness Program, made possible by selective dissemination of information, has solved the problem of making individuals cognizant of IIR&D efforts. Another distinct advantage of this data base is that it has circumvented duplication of work by industry during the PPBS cycle, thereby measurably reducing costs.

INTEREST PROFILES FOR RDE&MSL DIRECTORATES

I. *Ground Equipment and Materials Directorate*

010103	Aerodynamics—Aeraelasticity
010112	—Laads and Hinge Moments
0102	Aeranautics
0103	Aircraft
010505	Flight Displays, Devices
010506	Flight Test Suppart
0505	Human Factars Engineering
0508	Man-Machine Relations
07	Chemistry
0901	Components
0903	Electranics and Electrical Engineering

II. *Inertial Guidance and Control Directorate*

0104	Aircraft Flight Instrumentatian
010505	Air Facilities—Flight Displays, Devices Electranics and Electrical Engineering
0901	Campanents
0902	Camputers
0903	Electranics and Electrical Engineering
0904	Informatian Theory
090503	Cammand and Cantral Equipment
090504	Data Display
090505	Data Handling Equipment
0906	Telemetry
1307	Hydraulic and Pneumatic Equipment
15020601	Atamic Radiatian Effects an Materials and Campanents

Figure 2. Sample of Interest Profiles

COSATI Subject Fields

1. Aeranautics
2. Agriculture
3. Astranamy and Astraphysics
4. Atmaspheric Sciences
5. Behaviaral and Sacial Sciences
6. Bialagical and Medical Sciences
7. Chemistry
8. Earth Sciences and Oceanagraphy
9. Electranics and Electrical Engineering
10. Energy Canversian (Nan-Prapulsive)
11. Materials
12. Mathematical Sciences
13. Mechanical, Industrial, Civil, and Marine Engineering
14. Methads and Equipment
15. Military Sciences
16. Missile Technalagy
17. Navigatian, Cammunicatians, Detectian, and Cauntermeasures
18. Nuclear Science and Technalagy
19. Ordnance
20. Physics
21. Propulsian and Fuels
22. Space Technalagy

CODE NUMBER				
FIELD	GROUP	SECTION	UNIT	SCOPE
16				ROCKET & MISSILE TECHNOLOGY
16	01			ROCKET & MISSILE LAUNCHING AND GROUND SUPPORT
16	01	01		AEROBALLISTICS
16	10	02		ELECTRONIC GROUND SUPPORT EQUIPMENT
16	01	03		LAUNCH FACILITY DESIGN
16	01	04		LAUNCHING FROM AIRCRAFT
16	01	05		MECHANICAL GROUND SUPPORT EQUIPMENT
16	01	05	01	EGG CRATE

Figure 1. COSATI Codes and breakdown by field, group, sections and unit.

Laird Outlines Objectives Of Race Relations Institute Serving U.S. Armed Forces

Dedicating the new permanent home of the Defense Race Relations Institute, Patrick Air Force Base, Fla., Secretary of Defense Melvin R. Laird recently said its 11-month-old charter requires a continuing program of education for all members of the Armed Forces.

He noted, among its objectives, the minimizing of any behavior that might prevent defense personnel from working efficiently, that might depress moral or impair the effectiveness of our Armed Forces in their job of deterring conflict, and that, as a result could mean unnecessary casualties in combat.

Referring to additional aims of the institute, Secretary Laird said: "I hope that all connected with this institute will bring to its work a concern for justice and a deep sympathy for their fellowman."

He told students they would find commanders convinced of the need for their services and "eager to use" their talents, adding "I think the message that a general improvement in the state of race relations is a command responsibility—and an important one—is now well understood."

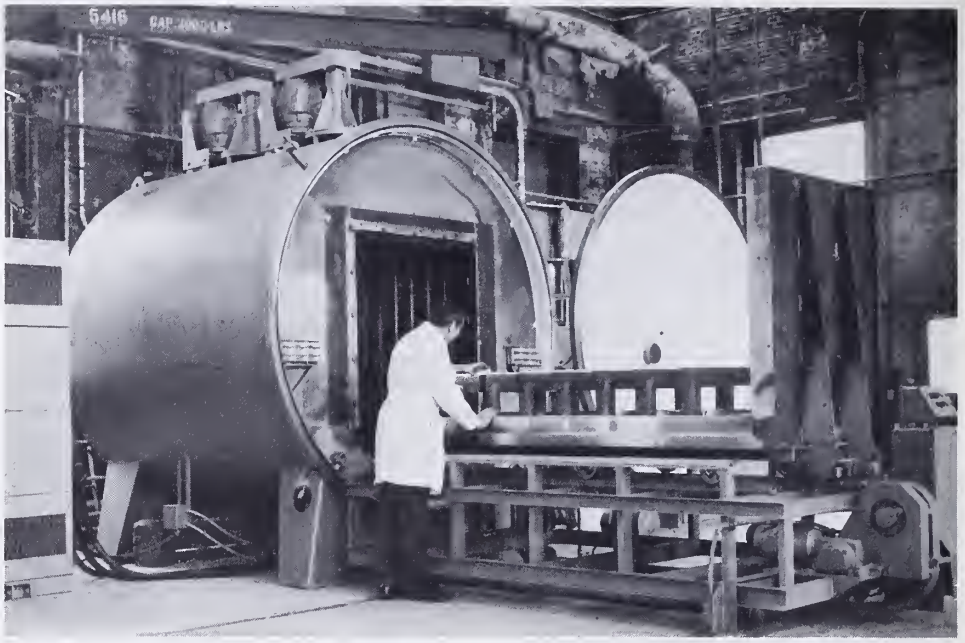
AMMRC Installs Unique Thermal Treatment Furnace

High-temperature (2300° F.—2500° F.) thermal treatment capability to homogenize critical cast and forged components requiring superior properties is a research objective at the Army Materials and Mechanics Research Center, Watertown, Mass.

The AMMRC Development and Engineering Laboratory recently installed a unique car bottom vacuum heat treatment furnace (Figure 1) which has a working area 36 inches wide and 72 inches long. It has the capability of operating at a normal temperature of 2500° F. under a vacuum of 0.1 microns and is constructed to heat to 2600° F. if necessary, a uniformly distributed load of 3000 pounds.

Arthur M. Ayvazian, a physical metallurgist in the Process Research Division, reports that the furnace is employed in a current AMMRC program to investigate the effect of high-temperature homogenization (above 2300° F.) on various castings and forgings to improve ductility, toughness and fatigue properties.

R&D studies have shown, he states, that a definite relationship exists between the development of optimum and maximum properties and the minimum amount of microsegregation present. Proved feasible by R&D studies, severe thermal treatments will eliminate or at least reduce microsegregation usually present to some degree in castings and forgings. It is anticipated that the critical properties under examination will be improved.



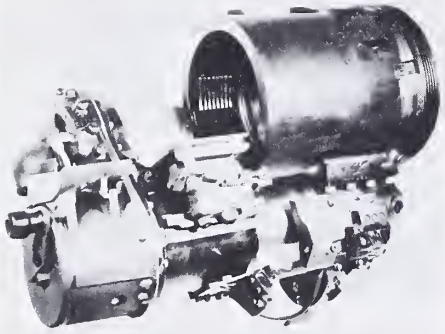
High Temperature Car Bottom Vacuum Furnace

Working with Watervliet Arsenal and TACOM personnel, AMMRC metallurgists will process critical castings and forgings difficult to procure, due to necessary stringent mechanical property specifications, and also where currently procured items have performed unsatisfactorily due to inferior properties.

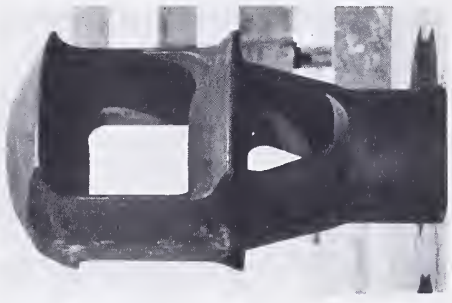
Some of the components to be used in the program are 4.2mm mortar bridge cup bodies, 152mm spindles, 152mm housings, 152mm couplings, 155mm muzzle brakes, 105 mm breech rings, heavy-duty drawbar ring couplers and road wheel arms (see Figure 2).

Results will contribute to the preparation of an extensive document containing technical and mechanical property data obtained after various homogenization treatments. This information will be available to desigers and contractors to serve as a supplementary guide when they are confronted with the problem of having to establish specified ductility and toughness properties at given strength levels for critical castings and forgings which are difficult and in some instances impossible to obtain by normal heat treatment practices.

R & D NEWS

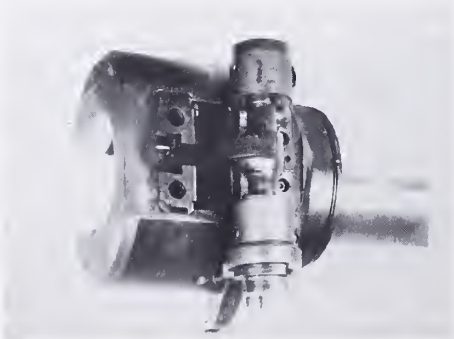


M-152 COUPLING



MUZZLE BRAKE

M-68 BREECH RING



MUCOM Sponsoring Symposium On Adhesives Bonding Progress

Processing for Adhesives Bonded Structures is the theme of a symposium to be sponsored by the Munitions Command (MUCOM), Picatinny Arsenal, Dover, N.J., at the Stevens Institute of Technology in Hoboken, N.J., Aug. 23–25.

Featured will be 35 technical papers to be presented on up-to-date processing data and technology related to adhesives bonding of structural components on the production line.

Papers will cover latest developments by the Army, Navy and Air Force, as well as industry, in adhesives bonding techniques. A special session will be devoted to problems encountered in production of military items.

Government personnel wishing additional information should contact M. J. Bodnar, Symposium Chairman, Picatinny Arsenal, Dover, N.J., Attn: SMUPA-FR-M-A or telephone: Autovon 880-3183 or (201) 328-3183.

CANNONS . . .

Tube Bore Inspections Improved at Watervliet

Advanced methods of inspecting and measuring cannon tube bores have been developed at Watervliet (N.Y.) Arsenal to meet critical dimensional and visual inspection requirements.

Improving on the conventional method of optically measuring the straightness of cannon tube bores, the arsenal has incorporated a laser measuring system for tube bore straightness, bore and rifling diameters, and the visual inspection of bore surfaces.

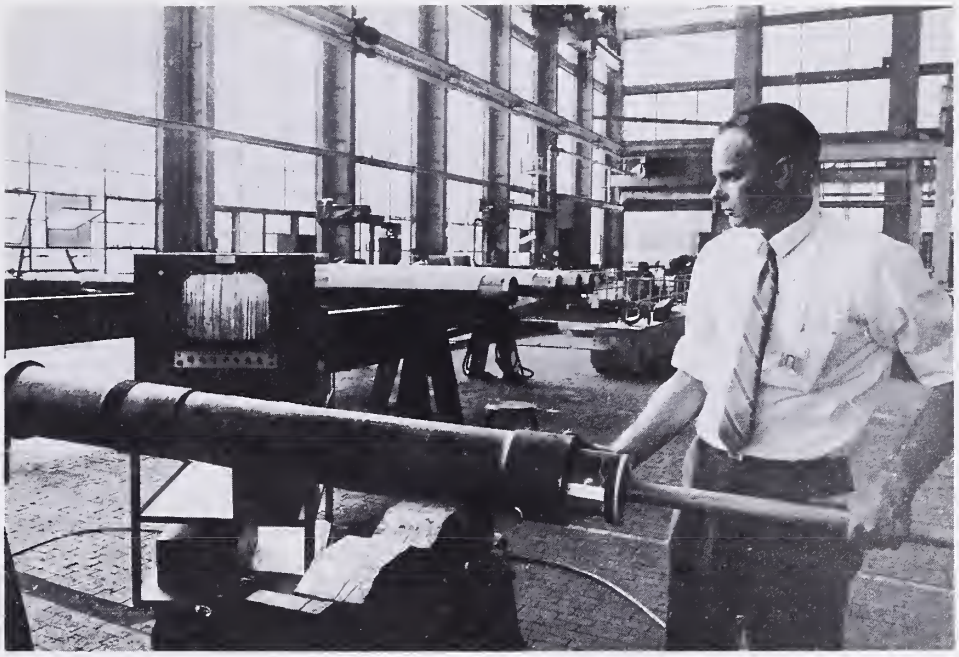
Employing a low-power helium-neon laser gun in place of the alignment telescope, and a laser light centering detector instead of the optical target, the laser beam establishes the tube's theoretical centerline. As the light detector is pushed through the cannon tube, any deviation from the laser beam is displayed on a meter to an accuracy of one-thousandth of an inch.

Results have indicated that measurements can be obtained faster and more accurately; also, more than one person can read the measurements, thus lessening the problem of operator eye fatigue.

Problems of air gauging, a technique used for years to measure cannon tube bore and rifling diameters and their eccentricities, have been alleviated by an electronic system devised at the arsenal.

Consisting of a plug-type head assembly housing four linear variable differential transformers (LVDT), the system permits measurements to be recorded automatically. One LVDT measures the bore diameter, one the rifling diameter, and the other two measure any eccentricity of the bore and rifling.

In operation, the head assembly is simply passed through the cannon tube and all three measurements—bore diameter, rifling diameter, and eccentricity—are displayed and recorded simultaneously at any point along the length of the cannon tube.



CLOSED CIRCUIT TV camera is inserted into a 152mm gun launcher to inspect tube.

Facilitating the visual inspection of cannon tube bore surfaces has been another arsenal innovation—a prototype closed-circuit television system (CCTV), designed and developed by Watervliet Arsenal.

With its special illuminating head, the camera can be inserted into the bore to give a 360-degree down-bore view as well as a direct mirror view for close examination of suspect areas. It is capable of 1,200 lines resolution with a compatible monitor.

By means of extensions, the camera can be inserted through any length of tube. Interchangeable lenses provide magnification 5 or 10 times that obtained with the conventional borescope.

Other advantages are: reduced inspection time, elimination of eye fatigue, and group viewing.

The laser, electronic, and closed circuit television systems have improved significantly the inspection techniques for cannon tube bores, arsenal researchers report.

AMMRC Using Small Brittle Materials Tester

Valid tensile tests on brittle materials can now be conducted by using a simple, inexpensive system conceived and developed at the Army Materials and Mechanics Research Center (AMMRC), Watertown, Mass.

The hollow cylinder tester into which the brittle material specimen is placed is approximately 2½ inches in diameter and 7½ inches long. Development of the method was prompted by inability of conventional-type tension pull machines to perform valid tests.

Specimens are restricted to a modified dumbbell type configuration since the method of testing involves hydraulic fluid pressure to exert a tensile force on the gauge section diameter.

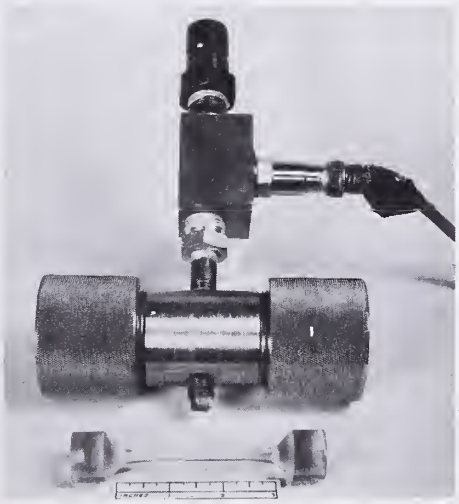
An elliptical fillet with a major axis of 1.5 inches and a minor axis of 0.28 inches is used to make the transition from the gauge section diameter to the larger end diameters.

Hydraulic pressure measured by a transducer is applied to the end diameters of the specimen through a port in the middle of the cylinder, producing an axial tensile force in the specimen gauge section.

Two o-rings encompass the ends of the specimen and also fit into a recess in each end of the cylinder. Two end caps which retain the o-rings in place also confine the specimen within the tester.

Flexibility of the o-rings permits the alignment of the specimen in the tester without imposing bending moments. Since the load applied to the specimen is made through the fluid medium, parasitic bending stresses can be effectively minimized through controlled manufacture of the specimen.

The stress condition can be readily and reliably determined through a force equilibrium condition. Load loss through contact between the o-rings and specimen can be determined by a simple calibration procedure. Alignment of the specimen, which is an ever-present problem in a conventional test system set-up, is controlled automatically.



Assembled Test Device and Test Specimen

Six Watervliet Scientists Present Mathematics Papers

Six Watervliet (N.Y.) Arsenal personnel were among some 40 scientists representing 18 Army research agencies and several universities who presented papers at the 18th Conference of Army Mathematicians at Picatinny Arsenal, Dover, N.J.

Their names and papers are: Dr. Eugene J. Brunelle, "Some New Problems in Geodynamics"; Dr. Peter C. T. Chen, "An Application of the Kantorovich Method to the Elastic/Plastic Buckling of Rectangular Plates"; Dr. Yun K. Huang, "Three Nonlinear Problems of Solids at High Pressures"; Dr. San Li Pu, "A Variational Principle for Singular Integral Equations with Bounded Solutions"; Dr. Julian J. Wu, "Application of the Finite Element Method to Nonconservative Stability Problems with Damping"; and Charles R. Thomas, "Flexural Vibrations of Laminated Plate Strips."

Edgewood Team Studies Man-Machine Problem

Human Factors Engineering, involving compatibility between military machines and weapons systems and the men who operate them, is currently undergoing extensive study at Edgewood (Md.) Arsenal by a 5-man team of scientists and engineers.

The Biomedical Laboratory's Human Factors Engineering Group is headed by Richard (Kim) Traub, an engineer and psychologist, who was appointed chairman in January 1972. Their purpose is to take into consideration man's capabilities and working conditions from the conception of a man-machine design through all subsequent development stages.

The group integrates its activities into the arsenal's development projects, and works closely with scientific personnel in materiel development, quality assurance functions and field test operations.

Human factors research accelerated during World War II with the increase of revolutionary technological developments in military equipment and supplies. As modern military arms became more sophisticated a distinct relationship became evident between the complexity of the machine or system and the frequency of human error.

A. Charles Karr, one of the three research psychologists assigned to the human factors group, explained:

"The complexity of machines developed during and immediately after World War II had reached the point where it was beyond the limits of man's ability to operate them correctly."

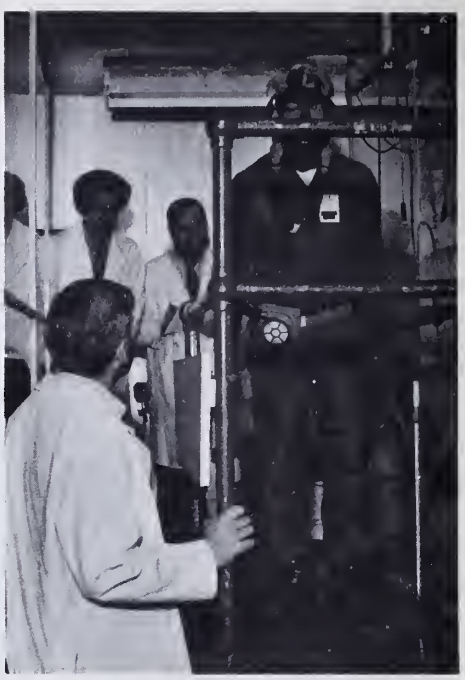
A charter member of the professional Human Factors Society, which he helped to organize in Tulsa, Okla., in 1957, Karr received a master's degree in experimental psychology from Lehigh University (Pa.) in 1953. He has been employed at the arsenal since 1968.

Joseph P. Delaney, a member of the group, is conducting human factors tests on the arsenal's binary chemical weapons system.

A research psychologist, he received a bachelor of arts degree in psychology from Northwestern University, Evanston, Ill., in 1960 and has been assigned to the arsenal's research laboratories since 1963.

Human factors engineering (HFE) strives to make the man-machine systems more efficient by helping to produce a product which is comfortable, safe and more compatible to the person operating it.

Still photography or video tape may often reveal significant details which escape vigilant personal observations during test actions, and are techniques highly rated by human factors engineers.



HUMAN FACTORS engineering technician Ronald P. Merkey (foreground) conducts a man-material experiment with the help of Samuel Jackson (left, rear), a research psychologist, and Richard (Kim) Traub (right, rear), chief of the Biomedical Laboratory's Human Factors Group.

Samuel Jackson, another research psychologist, has been engaged in human factors studies at the arsenal since 1960. He pointed out that an HFE investigation starts by analyzing an item under actual working conditions and charting the flow of events; saying: "Guided by this operation's sequence diagram, both the subject and the materials slated for testing are then brought together in an operational situation. The data collected usually points out any unusual amount of dexterity or degree of practice or training that will be required for a man to operate the machine efficiently."

Jackson received a master's degree in psychology from the University of Louisville in 1965, and is the author of numerous publications pertaining to HF studies.

Ronald P. Merkey, an engineering technician who is also a team member, is helping to conduct tests on personal respiratory equipment. He has been employed at the arsenal since 1963.

"All of the man-material and man-machine systems recently developed to meet the needs of our modern mechanized Army," Traub stated, "point out the necessity of conducting human factors studies during all phases of research and development."

Army Converts to New Vehicle Antifreeze Containers

Thirty years of U.S. Army use of a 2-package antifreeze for all of its vehicles will be phased out as supplies of a new solution are provided at an estimated 3-year saving of $2,232,000, attributable to single packaging.

Because of storage problems involving corrosion of the metal container when ethylene glycol solution and a rust inhibitor were combined, separate packaging was necessary until a new plastic container was developed.

Harry L. Ammlung, director of the Coating and Chemical Laboratory at Aberdeen (Md.) Proving Ground, said the new container is impervious to transmission of ultra-violet light. This is a critical factor to successful storage of antifreeze for long periods.

Commercial type antifreezes are not suitably formulated for universal use in Army vehicles, their high alkalinity being destructive to aluminum and some soldered components. The Army solution does not attack these components, but exposure to light in the standard commercial plastic container causes it to oxidize and precipitate out of solution—that is, to cake.

The "dipstick," also developed by the C& CL, is credited with a first-year saving to the Army of $6 million—by providing a reliable method of gauging corrosive alkalinity before serious engine or radiator damage occurs.

SINGLE-PACK ANTIFREEZE solution is displayed by Charles P. Jordan, chief of the Automotive Chemical Division, Coating and Chemical Laboratory, Aberdeen (Md.) Proving Ground. Chemist Harry H. Conley holds 2-package antifreeze which will be phased out as supplies of the new solution enter the Army supply system.

R & D NEWS

German Scientists:

MERDC Utilizes Talents Of Scientists, Engineers Under Exchange Program

GERMAN engineer-scientists assigned to the U.S. Army Mobility Equipment R&D Center (MERDC), shown with COL Bennett L. Lewis, MERDC commander, are (from left) Meinolf Heuel, Volkhard Visbeck and Siegfried Rinderknecht. Dr. Johann Hintenberger was not available when photo was taken, and Raynor Podlatis has returned to Germany.

Talents of German scientists and engineers are still being utilized by the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., under an International Professional Exchange Program.

The first German scientists-engineers were assigned to the center at the end of World War II.

Sponsored now by the Department of Defense, the IPEP is making available to the MERDC the contributions German scientists-engineers may be able to make in such diverse fields as water purification, camouflage and deception and bridges.

Under the bilateral arrangement with the German Ministry of Defense, the IPEP serves the interests of international cooperation and understanding through on-the-job research, development, test and evaluation assignments of foreign professional personnel within the U.S. defense establishment.

Three German Nationals are working at the MERDC, one each in the Sanitary Sciences Division, Marine and Bridge Division, and Barrier and Countersurveillance Division. Two others recently completed one-year assignments and have returned to West Germany.

Prior to returning to their homes in Germany, Volkhard Visbeck and Raynor Podlatis were honored at ceremonies at which MERDC CO COL Bennett L. Lewis presented them with Certificates of Achievement.

Visbeck was cited for participating in "various problems analyses related to the development of procedures and apparatus for test of a generic helicopter-mounted fire suppression unit" and for conceiving "a new approach to the refilling of fire extinguishing bottles with CF_3Br, a new vaporizing liquid type extinguishing agent."

Visbeck designed and built apparatus in-house to demonstrate satisfactorily a concept which may be used in the field to refill expensive fire extinguishing bottles used on armored vehicles.

Podlatis, an electrical engineer, was cited for "significant contributions to the resolution of electrical problems on powered materials handling equipment," while assigned to the Mechanical Equipment Division.

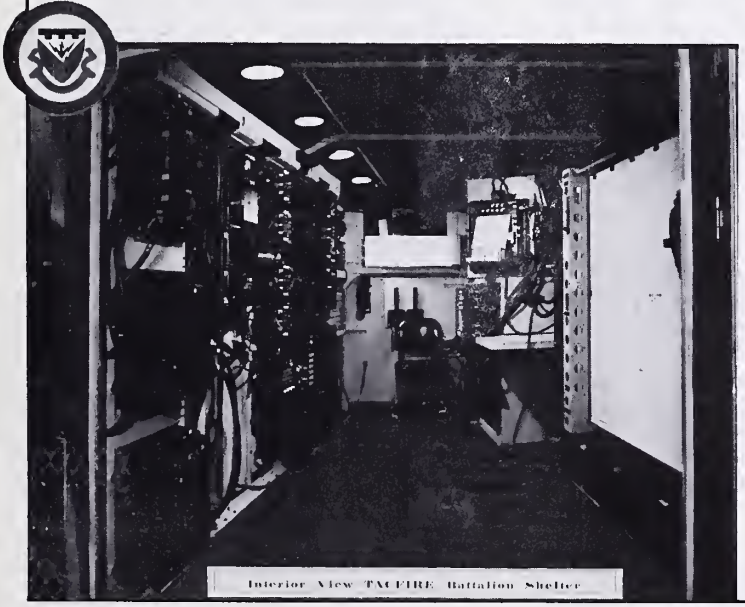
The citation states he "developed and implemented an electrical control system for operating and sequencing a test stand for forklift truck masts, and analyzed, evaluated and resolved a serious condition of boiling electrolyte in the battery of an electric powered forklift truck."

Currently working at the center under the IPEP are Dr. Johann Hintenberger, Siegfried Rinderknecht and Meinolf Heuel. Dr. Hintenberger, a microbiologist, is assigned to the Sanitary Sciences Division on the Reverse Osmosis Project with special emphasis on the bacteriological aspects of water purification.

Rinderknecht, a civil engineer, is assigned to the Marine and Bridge Division, and is concerned with the medium girder bridge development. Heuel, a physicist, is working on the camouflage program in the Barrier and Countersurveillance Division.

While working at the center, the German scientists and engineers remain in the employ of their own government and have no impact on local personnel spaces or funding. All personal expenses, travel arrangements and administration for each foreign professional personnel are the responsibility of their government.

TACFIRE . . .
Integrated Tactical Computer System Being Tested for Field Artillery Use



TACFIRE, the tactical computer system that makes all calculations necessary for effective artillery fire, is undergoing engineering and expanded service testing at Fort Sill, Okla., White Sands Missile Range, N. Mex., and Fort Huachuca, Ariz.

Test models of TACFIRE were shipped to the test sites after they were accepted by the Office of the Project Manager, Army Tactical Data Systems (ARTADS) located at Fort Monmouth, N.J. The contractor is the Data Systems Division, Litton Industries.

BG Albert B. Crawford Jr. is ARTADS project manager and COL Duane L. Emerson is TACFIRE project director.

TACFIRE is an integrated on-line tactical computer system designed to be sent to the field with the Army's field artillery units if production is authorized after completion of the engineering and expanded service tests, which are expected to last about a year.

TACFIRE is expected to improve field artillery fire support with increased accuracy, better and more rapid use of target information, reduced reaction time and greater efficiency in the assessment of fire capabilities and the allocation of fire units to targets. Such calculations are currently made manually.

The system is intended to apply automatic data processing techniques to the seven field artillery functions of fire control, fire planning, target intelligence, survey, meteorological calculation, and ammunition and fire status reporting.

TACFIRE will be installed in standard Army S-280 shelters in both towed and mechanized artillery units. This permits transport of the equipment in a ready to operate configuration and provides for rapid deployment and set-up in bunkers or buildings.

The nerve center is a third-generation computer designed specifically for the military environment, including continual monitoring of performance and rapid isolation of faults.

Edgewood Studying Bee Venom for Human Pain Relief

The sting of the busiest of all bees, the honey bee, has taken on significance in medical research at Edgewood (Md.) Arsenal's Biomedical Laboratory. Scientists are studying a nontoxic component of its venom in the hope it may prove useful in relieving the aches and pains of bursitis, arthritis and general neuralgia.

Preliminary experiments on animals have indicated that apamin, one of the three active components of bee venom, increases both the beat and force of the heart pumping blood into the body.

Other studies have revealed that the venom can be used to regulate the heart's rhythm for almost 90 minutes. In comparison, commercial drugs used to control irregular heartbeats have a duration of five to 10 minutes.

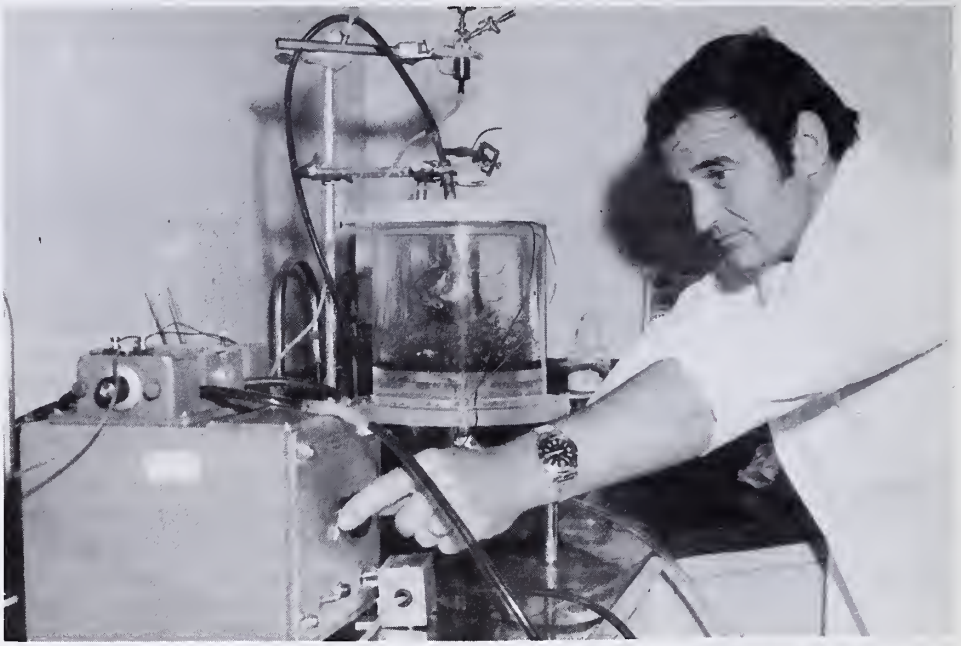
Effects of apamin in the cardiovascular system have been studied in more than 30 isolated Langendorff heart preparations. Scientists use this method to study the actions of drugs in the heart. When separated from bee venom, apamin appears to be nontoxic and acts to sustain the body's blood flow network during periods of severe bleeding and shock.

MAJ James A. Vick, chief of the Neurophysiology Section in the arsenal's Biomedical Laboratory, said the honey bee venom contains two other chemical components more toxic than apamin. "Both phospholipase A and melittin are blocking agents which produce a lethal effect through respiratory paralysis," he explained.

A pioneer in developing the use of bee spleen for medical purposes, MAJ Vick pointed out that the two components account for 85 percent of the venom's chemical constituents, and the total content of apamin is less than two percent.

In 1967 he began experimenting with bee venom at Edgewood Arsenal and carried on his studies while serving at the Walter Reed Medical Center, Washington, D.C. His research on pharmacological and physiological activities of bee venom continued when he was reassigned to Edgewood Arsenal in 1971.

Results are described in a technical paper "Beta Adrenergic and Anti-Arrhythmic—Effect of Apamin, A Component of Bee Venom" prepared for delivery Mar. 10, 1972, before the 56th annual meeting of the Federation of American Societies of Experimental Biology.



RESEARCH PHYSIOLOGIST MAJ James A. Vick uses a Langendorff heart preparation apparatus to study effects of bee venom on the heart in Edgewood Arsenal experiment.

Coauthored with William H. Shipman, a research chemist at the Naval Underseas Research and Development Center, San Diego, Calif., the paper was sponsored by Charles C. Hassett, chief of Edgewood Arsenal's Experimental Medicine Division.

Other studies on animals have confirmed that whole bee venom is a mixture of substances capable of producing a variety of physiological and pharmacological changes.

In another paper prepared in association with Shipman and Stephen J. Phillips of the department of surgery, in Detroit's Sinai Hospital, MAJ Vick indicated that both whole bee venom and one of its components, melittin, are capable of producing marked and sustained increases in cortisone levels. Their studies show increases occur approximately one hour following injections under the skin and last from two to four days.

"This is surprising," he said, "since bee venom is 75 percent melittin but only a tiny amount is required to produce the same level of cortisone as the whole bee venom. It is well documented that arthritic conditions respond favorably to the administration of cortisone drugs."

MAJ Vick's research experiments in arthritic conditions are conducted in association with Robert B. Brooks of the Warren Foundation. He is assisted in his studies by Harry Froehlich, a research physiologist.

MAJ VICK is a native of Crookston, Minn., who entered the Army as an enlisted man in 1951, served two years with the 136th Infantry Division, and received a direct commission in 1953. During military service, he completed the surgical technical school and was later named chief medical aidman at Brooke Army Hospital, Fort Sam Houston, Tex.

For the next ten years, until 1963, he was a student, instructor and research associate at several mid-western colleges. He trained in physiology and pharmacology at the University of North Dakota at Grand Forks, and the University of Minnesota Medical School in Minneapolis.

That same year he returned to active military duty and was reassigned to Edgewood Arsenal as a research physiologist. After completing the Advanced Officers Course at Fort Sam Houston in 1968, he served at Walter Reed Hospital as chief of cardiovascular pharmacology until 1971.

The author of more than 120 scientific papers, he has served as an assistant professor in pharmacology at the University of Maryland, Baltimore Campus, since 1968. He is a member of the Military Surgeons Association and the New York Academy of Sciences.

His awards and decorations include a Presidential Unit Citation, Distinguished Unit Citation and the Field Medical Badge.

He has also been awarded the Deep Sea Diving Badge for conducting underwater studies on venomous sea snakes for the U.S. Navy.

R & D NEWS

Major Army RDT&E, Procurement Contracts Exceed $288 Million

Army contracts for research, development, test, evaluation and materiel or services procurement totaled $288,031,091.00 from Apr. 1 to May 31. This list includes only contracts exceeding $1 million.

Diamond Reo Trucks, Inc., is receiving $27,716,771 for 2½-ton trucks and the AM General Corp. was awarded a $26,035,543 increment to a 3-year multiyear contract for ¼-ton trucks, M151A2 series. FMC Corp. gained a $20,140,972 contract for Model M113A1 vehicles.

Marathon Le Tourneau, Inc., received a $13,260,000 modification to a previously awarded contract for 750-pound bombs, M117A3. Harvard Industries, Inc., was awarded a $11,193,824 contract for AN/GRC-144 radio sets. Chris Berg, Inc., gained a $10,717,000 contract for construction of facilities for the Safeguard Ballistic Missile Defense System and Alcotronics Corp. was issued a $10,575,525 contract for booster parts, M125A1, for M557 fuzes.

Contracts under $10 million. The Boeing Co., Vertol Division, $9,500,000 for CH-47C helicopters; H. C. Smith and the Boeing Co., $8,896,491 in a joint venture for construction of Safeguard remote Sprint launch sites; and

Smith-Boeing, $8,835,298 for a joint venture to construct additional Sprint launch sites; Colt Industries Operating Corp., $8,445,681 for M16A1 5.56mm rifles; Gulf & Western Industries, Inc., $5,771,705 for 20mm brass cartridge cases, M103; Hazeltine Corp., $5,288,162 for interrogator sets and test beds.

Contracts under $5 million. Boeing Co., $4,890,000 to develop an experimental engine to power the dynamic system test rig for feasibility demonstration of the rotor drive system advanced technology component for the Heavy Lift Helicopter; LTV Aerospace Corp., $4,877,749 for a feasibility demonstration program on optical sensor performance in support of the Army Ballistic Missile Defense Agency; and

Diamond Reo Trucks, Inc., $4,300,751 for engines for M602 trucks; Hughes Aircraft Co., $3,997,000 for the optical sensor systems development or SCOOP program; AMF Inc., $3,833,664 for M117A3 bomb parts; Raytheon Co., $3,824,582 for time-division multiple-access subsystems for use in defense satellite communications; Institute for Defense Analyses, $3,763,000 for studies and analyses for the Weapons Systems Evaluation Group; and

Bulova Watch Co., $3,744,000 for head assemblies, T336E7, for M525 fuzes; Bowen-McLaughlin York Co., division of HARSCO, $3,008,657 for engineering services for the M88 Medium Recovery Vehicle; Western Electric Co., $3,000,000 for engineering change proposals for the Safeguard production program; and

Xyzyx/Parsons, $2,939,036 in a joint venture for additional architect/engineer services for development of technical logistics data and maintenance data systems documentation for Safeguard sites; Rand Corp., $2,825,170 for research in the field of military science and technology; and

American Air Filter Co., $2,758,362 for fire-fighting trucks; Litton Systems, Inc., $2,701,657 for engineering development models of the AN/PSN-6 Loran navigational set; National Eastern Corp., $2,543,810 for 20mm, M103 cartridges; and

Western Electric Co., $2,398,330 and $2,289,300 for research and development for the Spartan and Sprint subsystem of the Safeguard system; Lockheed Missile & Space Co., $2,336,075 for validation prototypes for military engineering construction equipment; and

Olin Corp., $2,220,900 for small arms ammunition propellant; Norris Industries, Inc., $2,187,533 for 81mm projectiles and $2,135,750 for 66mm rocket launchers; and

General Motors Corp., $2,117,193 for tractor trucks and dump trucks; Hughes Aircraft Co., $2,068,093 for radio sets and battery boxes; Brown Engineering Co., $2,013,632 for system engineering and technical assistance to support the Site Defense Program; and

Honeywell Radiation Center, $1,904,396 to develop a rocket payload for auroral measurements; Gulf & Western Industries, Inc., $1,888,600 for 20mm brass cartridge cases, M103; RCA Corp., $1,851,196 for the supply, installation and acceptance test of a color television production and distribution system; and

General Electric Co., $1,873,555 for 20mm guns, GAU4/A, and armament pods, SUU23A; United Ammunition Container, Inc., $1,830,367 for containers; Applied Devices Corp., $1,814,281 for modification kits for Hawk simulators; and

Textron, Inc., $1,811,906 for modification kits for classified application; United Aircraft Corp., $1,771,000 for addition of a second aircraft to the advance blade concept; Chamberlain Manufacturing Corp., $1,743,316 for 60mm high explosive, M49A3 projectiles; and

National Union Electric Corp., $1,693,038 for metal parts for bomb fuzes, M904E3 and arming devices, MK32; General Motors Corp., $1,633,421 for transmissions for M113 vehicles; Standard Armament, Inc., $1,629,940 for launcher rockets; Heckethorn Manufacturing Co., $1,623,840 for M406 40mm projectile parts; and

Hercules, Inc., $1,516,000 for manufacture of Sprint missile nozzles; AVCO Corp., $1,463,853 for conversion of T55-L-11 engines to T55-L-11A; Bulova Watch Co., $1,439,984 for point detonating fuzes, M524A6; Union Carbide Corp., $1,415,776 for batteries; and

Philco Ford Corp., $1,370,360 for additional R&D on the Chaparral weapons system; Textron, Inc., $1,325,000 for modification kits for a classified application; Systems Development Corp., $1,281,147 for systems engineering services in support of the Army Tactical Data System; and

Boving and Co., $1,264,587 for design, manufacture and delivery of hydraulic turbines; Northrop Corp., $1,261,048 for Hawk wings and elevons; Saunders Associates, Inc., $1,226,000 for 12 months of classified R&D follow-on study and data; and

Western Electric Co., $1,225,240 for spare parts for the Perimeter Acquisition Radar and Missile Site Radar Tactical Softwear Centers; Vanbar, $1,172,590 for antennas; LaBarge, Inc., $1,159,000 for miniaturized seismic intrusion devices; FMC Corp., $1,149,751 for roadwheels; AVCO Corp., $1,143,000 for components for a high-frequency receiver; and

Futuronics Corp., $1,107,975 increment of a 2-year multiyear contract for modems (an electronic device used to adapt teletype signals for radio transmission); Raytheon Co., $1,031,658 for repairing and rebuilding the oscillators for the Hawk missile system; Servo Corp. of America, $1,021,900 for antennas.

AMMRA Engineer's Paper Wins Welding Society's 1971 Award

Dr. Thomas P. Rich, research mechanical engineer at the Army Materials and Mechanics Research Center, Watertown, Mass., recently received the William Spraragen Award for 1971 presented by the American Welding Society.

The annual award honoring Spraragen's technological contributions to welding was first presented in 1961 for the best research paper printed in the Supplement of the *Welding Journal* during the preceding calendar year.

Dr. Rich's paper, "The Forge Phase of Friction Welding," was coauthored with Dr. Richard Roberts of Lehigh University, Bethlehem, Pa. The paper reports on an experimental study of the fundamental mechanisms of the friction welding process. Highly exploited by Russian technology in recent years, the process provides a means for joining similar and dissimilar materials.

Dr. Rich received an ME degree from Carnegie-Mellon University in 1967 and was awarded a NASA Fellowship by the Materiels Research Center at Lehigh University for his PhD study on friction welding.

Truss Web Landing Mat Scheduled for Operational Testing

Demonstrated in engineering tests as capable of supporting heavy-duty aircraft, a new truss web landing mat is scheduled for operational testing at Dyess Air Force Base, Tex., early in Calendar Year 1973.

The experimental mat is designed to support operations of the F-111B fighter-bomber or comparable heavy-duty aircraft having an equivalent single-wheel load of 50,000 pounds and tire-inflation pressure of 250 pounds per square inch.

Engineering traffic tests at the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., used a load cart simulating one wheel of the F-111B aircraft. With a jet engine mounted on a stand, the mat was subjected to the jet blast and high temperatures experienced during takeoff. Landings on carriers and runway overruns were simulated with arresting-hook-impact tests and cable roll-over tests. The mat successfully met all requirements.

A contract exceeding $500,000 with Dow Chemical Co., Midland, Mich., calls for the extrusion, fabrication, and delivery of 110,160 square feet of the mat. This amount of mat will weigh 350 tons, and would make a 2-foot-wide walk 10 miles long, or cover more than two football fields.

Army R&D Achievement Awards . . .

Peak of Army Prestige for In-House Laboratory Personnel Attained by 28 Research Team Members, 14 Individuals

Responsiveness to requirements for ammunition, explosives and fuzing devices for combat in Southeast Asia is dominantly demonstrated among winners of the 12th annual Army Research and Development Achievement Awards.

Nearly half of the selectees for what is regarded as the U.S. Army's most prestigious recognition for research conducted by scientists and engineers at its in-house laboratories and arsenals were chosen for notable contributions in ammunition and explosives.

Picatinny Arsenal, Dover, N.J., Headquarters of the U.S. Army Munitions Command (MUCOM)—and historically for more than a century a focal point for research, development and production of munitions—has 18 of the 42 winners of 1972 Army Research and Development Achievement Award winners. Six are on one team and four each on two other teams.

The U.S. Army Electronics Command has six winners, including two 2-man teams, and the Weapons Command is represented by a 4-man team. The Natick (Mass.) Laboratories turned up three winners including a 2-man team. Except for a 2-man team at the U.S. Army Institute of Surgical Research, the other winners are cited for individual efforts.

Two of the individuals were selected for contributions to research projects considered among the most significant achievements of U.S. Army R&D activities in recent years, insofar as they are believed to have great potential for civilian as well as for military applications.

Dr. Mary Mandels, of the much celebrated husband (Gabriel) and wife scientific team at the Natick Laboratories, was selected for her contributions to the complex enzymatic process developed to convert cellulose products (waste paper of all types) into glucose products, including sugar and a clean-burning fuel, ethanol.

Bobbie H. Gray, U.S. Army Construction Engineering Research Laboratory, was selected for his contribution to the development and application of fibrous concrete to provide greatly strengthened airfield runways. This is viewed as having great importance for both military and civilian needs.

One of the most distinguished winners is Dr. Stanley Kronenberg, who has devoted most of his professional career to the U.S. Army Electronics Command and its predecessor organizations. One of his major claims to international renown is that of authoring what has been acclaimed as the most comprehensive work of its kind ever published, the U.S. Army Monograph Series book titled *High Intensity Radiation Dosimetry with SEMI-RAD.*

Army Chief of Research and Development LTG William C. Gribble Jr., Deputy CRD MG George Sammet Jr. and Army Chief Scientist Dr. Marvin E. Lasser will share in presenting the R&D Achievement Awards to winners in ceremonies at installations where they are employed. The customary wall plaques have been modified and a new heavy cast bronze medallion desk decoration will replace the presentation of lapel pins.

Established criteria for the award require a scientific or engineering achievement by in-house laboratory personnel that provides a scientific basis for subsequent technical improvement of military importance, that materially improves the Army's technical capability, and/or contributes materially to national welfare.

Winners this year were selected by an 8-member panel of judges representing the major scientific disciplinary areas, chosen from the key professional staff within the Office of the Chief of R&D, HQ DA. Dr. Ivan R. Hershner, chief of the Physical and Engineering Sciences Division, was chairman.

Other members included COL Garrison Rapmund, chief of the Life Sciences Division; Dr. Desmond C. O'Connor, chief of the Environmental Sciences Division; LTC Clifford J. Fralen, Directorate of Developments; LTC James H. Sloan Jr., Advanced Ballistic Missile Defense Agency; MAJ Gilbert J. Stieglitz, Directorate of Plans and Programs; Dr. Vitalij Garber, Directorate of Developments; and Dr. Richard L. Haley, Directorate of Missiles and Space.

Nominations for the awards were made by the commanding general, U.S. Army Materiel Command; the Chief of Engineers; The Surgeon General; the Safeguard System manager; director of the Land Warfare Laboratory; and the director of Advanced Ballistic Missile Defense.

The winners, listed within the major command, subcommand and the installation at which they are employed, and a brief description of the achievements judged deserving of recognition are:

ARMY MATERIEL COMMAND

MUNITIONS COMMAND, Picatinny Arsenal, Dover, N.J. A 6-man team from the Rocket Assisted Projectile and Pyrotechnics Branch was selected for

(Continued on page 22)

awards

Brazilian Scientists Win 1972 Lafi Prize for Research

Experimental chemotherapy of schistosomiasis (snail fever) recently earned two Brazilian scientists the 1972 Lafi Foundation Prize for research.

Their investigations were supported in part by grants from the Life Sciences Division, U.S. Army Research Office, Office of the Chief of Research and Development and the U.S. Army Medical Research and Development Command.

Administered by the Brazilian National Jury for Medical Sciences, the prize was awarded to Dr. Jose Pellegrino, Institute of Biological Sciences, Federal University of Minas Gerais, and Naftale Katz, Research Center Rene Rachou, National Institute of Endemic Rural Diseases, Belo Horizonte, Brazil.

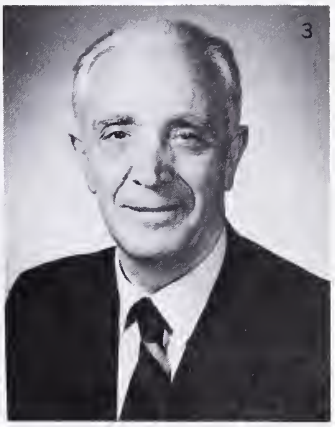
Schistosomiasis is of worldwide concern, rivaling malaria as one of man's most common and serious diseases. Despite long continued efforts, there is at present no easily used, safe drug and no way to prevent reinfection by the small worm that causes the disease.

Widespread in the tropics and semitropics, schistosomiasis has been a major health problem in Brazil, Egypt, Puerto Rico, Japan, and the Philippines.

The glabratus snail, common in fresh water in South America, carries "schisto." The life cycle begins as eggs are shed by warm-blooded animals, usually by the fecal or urinary route. The first-stage larvae are picked up by snails and develop in the snail body. The second-stage larvae leave the snail in a free-swimming state in a pond or irrigation ditch.

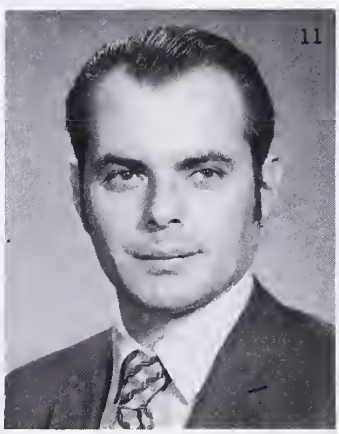
Contact with the microscopic organism causes an infection which, even when very mild, has a severe incapacitating reaction to either man or animal.

Drs. Pellegrino and Katz were credited, in the Lafi Foundation Prize citation, for application of modern drugs to control schistosomiasis on a village scale. The study focused attention on the over-all problems of schistosomiasis and the rapidity with which reinfection occurs after the active control program ceases.



R&D Achievement Award Winners

AMC, MUCOM, Picatinny Arsenal, Dover, N.J.—**(1) Raymond Goldstein (2) front, Joseph J. Gurrera, Saul Wasserman; rear, Richard D. Botticelli, John Smolnik, Stephen J. Harnett, Frederick H. Menke (3) Dragolyoub Popovitch (4) front, Oscar C. Gaffney, Ronald M. Corn; rear, Lloyd R. Coon, Joseph R. Messineo (5) Dwight Hlustick, Louis Jablansky (6) front, Dr. Everett E. Gilbert, Victor I. Siele; rear, John R. Leccacorvi, Maurice Warman.** AMC, ECOM, Fort Monmouth, N.J.—**(7) Dr. Stanley Kronenberg (8) Norman L. Yeamans (9) Vladimir G. Gelnovatch (10) Bernard Flood (11) William R. Fuschetto (12) John E. Creedon.**



Army Research & Development Achievement Awards

(Continued from page 20)

outstanding engineering ability, imagination, initiative and efficiency in developing the Free World's first operational artillery-launched, zoned, Rocket-Assisted Projectiles (RAPs).

Developed completely on an in-house basis, the ammunition has proved capable of withstanding the high accelerations, spin-rates and stresses associated with launching from high-pressure guns under extreme hot and cold temperature conditions. The redesigned RAPs provide major technological advances in accuracy, propulsion efficiency, effectiveness and reliability over experimental models based on earlier technology.

Team members credited with surmounting the severe problems with RAPs are *Saul Wasserman, Frederick H. Menke, John Smolnik, Richard D. Botticelli, Stephen J. Harnett,* and *Joseph J. Gurrera.* (For further information on standardization of RAPs, see 1972 January-February issue of the *Army R&D Newsmagazine,* p. 8.)

Ronald M. Corn, Joseph R. Messineo, Lloyd R. Coon and *Oscar C. Gaffney* of Warheads and Special Projects Branch were nominated for engineering contributions to development of the 155mm XM483 ICM projectile.

Currently under advanced development, this round is the forerunner of a new family of projectiles intended to provide the Army with an indirect fire capability against enemy armor. The award winners are credited with resolving a number of formidable engineering problems.

Dr. Everett E. Gilbert, Victor I. Siele, Maurice Warman and *John R. Leccacorvi,* chemists in the Explosives Division, broadened the understanding of the chemistry of hexamine. This is the basic raw material for the manufacture of HMX and RDX, two of the most powerful military explosives known.

The Picatinny researchers conceived and experimentally demonstrated the first known alternate synthesis for HMX employing inexpensive and readily available materials. Their efforts reportedly have established the possibility of developing a cheaper, more flexible manufacturing process.

They also demonstrated that an intermediate in the new synthesis exists in polymorphic modifications—a finding that may contribute to a greater understanding of the similar structural forms of HMX.

In addition to providing the Army with a potential for achieving significant improvements in future HMX manufacture, these findings are important because of the increased emphasis placed by the Army and the Department of Defense on the elimination of pollution in munitions manufacturing.

Louis Jablansky and *Dwight Hlustick* participated in the design and development of the PDT-1 detonation trap system. Both are employed in the Advanced Process Technology Division of the Manufacturing Technology Directorate at Picatinny Arsenal.

The achievement represents a breakthrough in halting the spread of an explosion in a pipeline or a similar conduit which contains an explosive fluid. The PDT-1 system can sense and interrupt the propagation of a detonation wave, attenuate it to a minimum energy level, and render it ineffective in producing further destructive effects during the manufacture and processing of detonable materials.

Expected to improve safety immeasurably in plants that process explosive media, the PDT-1 is a key element in plans for new process technology that will substantially enhance the U.S. military/industrial potential. Designed to safeguard lives and property, this development is expected to be useful in civilian as well as military applications.

Dragolyoub Popovitch was selected in recognition of engineering that culminated in the successful development of a new mechanical time fuze for artillery projectiles.

The Mechanical Time-Super Quick (MTSQ) fuze, which adapts the "wrist watch" type of movement to ordnance fuzes, is cited as "the first new approach to mechanical timekeeping in ordnance in 50 years."

The MTSQ provides the U.S. Army with a fuze of unprecedented accuracy and precision combined with ease of use and economy of manufacture. It permits continued improvement of conventional munitions requiring fuzing accuracy and safety in flight not heretofore available.

Raymond Goldstein will receive an R&D Award for conceiving and demonstrating a fuze technique which served to optimize the Army's capability to defeat bunkers with the 2.75-inch rocket.

Complemented by a highly satisfactory performance evaluation on munitions in South Vietnam, the successful test program has stimulated development of this fuze technique in other munitions within the services.

Goldstein has been a weapon system engineer with the Office of the Project Manager for 2.75-inch Rocket System since 1968.

ELECTRONICS COMMAND, Fort Monmouth, N.J. John E. Creedon and *Norman L. Yeamans* will receive awards for a major breakthrough in the design

(Continued on page 24)

awards

Dr. Grubbs, ASQC Founding Fellow, Wins Shewhart Medal

One of the Founding Fellows of the American Society for Quality Control, a much-honored U.S. Army mathematician and statistician, is the 1971 winner of its most coveted token of distinction, the Shewhart Medal.

Dr. Frank E. Grubbs, chief operations research analyst of the U.S. Army Aberdeen (Md.) Research and Development Center, was presented the medal at the ASQC annual Honors Convocation in May at Washington, D.C. The citation states:

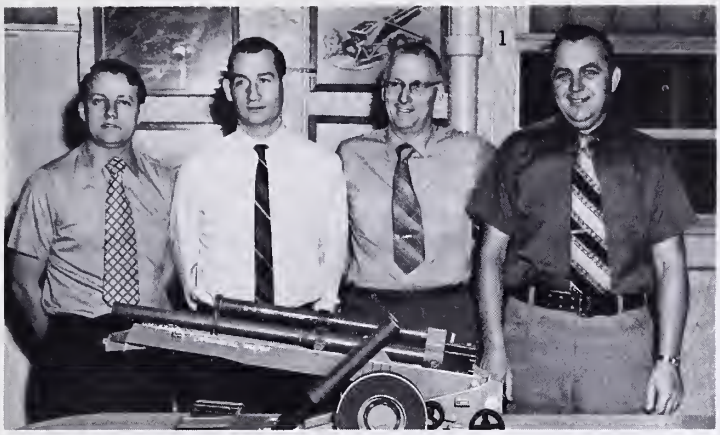
Dr. Frank E. Grubbs

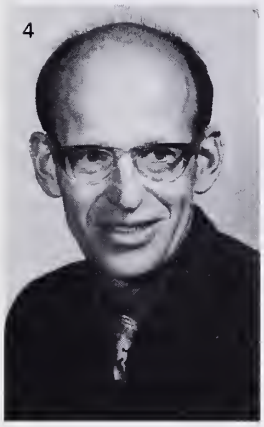
"To Dr. Frank E. Grubbs in recognition of his basic contributions to procedure for detecting and treating outlying observations in experimental work, for pioneer work in design and anaylsis of experiments for estimating precision and accuracy, and statistical quality control methodology. . . ."

The Shewhart Medal is presented annually to the individual deemed by the ASQC awards committee to have made the most outstanding contribution to the science and techniques of quality control, or who has demonstrated outstanding leadership in the field of modern quality control.

In 1964, Dr. Grubbs received the Samuel S. Wilks (Princeton University professor) Memorial Medal sponsored jointly by the American Statistical Association and the Department of the Army. He is widely known for his many scientific papers and contributions to statistics, quality control, design of experiments, reliability, and operations research.

His acceptance speech for the Shewhart Medal, "Modern Quality Control—the Strong Bridge Between Statistical Theory and Practice," will be reported in *Quality Progress,* the monthly newsmagazine of the ASQC.





R&D Achievement Award Winners

AMC, WECOM, Rock Island, Ill.—**(1) From left, Robert E. Seamands, Robert** L. **Gritton, Michael C. Nerdahl, Gilbert J. Melow Jr.** OCRD, ABMDA, Huntsville (Ala.) Office—**(2) Charles W. Mead (3) Charles R. Vick.** OCRD, LWL, Aberdeen (Md.) Proving Ground—**(4) Robert P. McGowan.** AMC, AARDC, Aberdeen, (Md.) Proving Ground—**(5) Priscilla W. Kingman.** AMC, MICOM, Redstone (Ala.) Arsenal—**(6) Joe Shelton.** AMC, HDL, Washington, D.C.—**(7) John R. Dent.** CE, CERL, Champaign, Ill.—**(8) Bobbie H. Gray.** OTSG, USAISR, Brooke Army Medical Center, Fort Sam Houston, Tex—**(9) Dr. Arthur D. Mason (10) Robert B. Lindberg.** AMC, NLABS, Natick, Mass.—**(11) Leo A. Spano (12) Vincent D. Iacono (13) Dr. Mary Mandels.** AMC, FSTC, Charlottesville, Va.—**(14) Charles G. Huie.** SSC, SAFSCO, Arlington, Va.—**(15) John J. Shea.**

Army R&D Achievement Awards

(Continued on page 22)

and application of optical pumps to lasers.

Employed as physicists in the Electronics Technology and Devices Laboratory at ECOM, they developed a new mode of operation that eliminates the repetitive high-voltage trigger and its deleterious effects on pump life and the radio-frequency interference. The design concepts have improved laser heads for several military rangefinder and target designator systems.

Bernard Flood and *William R. Fuschetto* were cited for design and development of Interference Generator SG 886 T/UR (ECOM Training Device) while employed at the ECOM Electronic Warfare Laboratory.

The SG 886 is cited as the answer to the Army's need for an ECOM Device to train communications operators to recognize enemy jamming, and to effectively operate their radio sets in spite of jamming. The device is considerably smaller and less expensive than any now in the Army inventory.

Vladimir G. Gelnovatch, an electronic engineer with the Electronics Technology and Devices Laboratory, was cited for contributions to development of an optimal seeking computer program for design of microwave integrated circuits.

Called DEMON (Diminishing Error Method of Optimization for Networks), the program allows a designer to synthesize fully a microwave network in a matter of a day (a job that otherwise could take months). Input and output are designed for extremely rapid user familiarization and optimized output data is given in both analytical and graphical values.

This achievement reportedly makes feasible the design of microwave integrated circuits of the levels of complexity required for the next generation of Army microwave equipment.

Dr. Stanley Kronenberg was selected to receive the award in recognition of the discovery of a new radiation phenomenon, educidation of the physical processes involved, and application of the effect to create a novel, lightweight, hand-held directional radiation survey meter.

The instrument quantitatively measures the direction of arrival of incoming gamma or X-rays. It permits a scan of a radiation environment much as one surveys visible light distribution with a photographic exposure meter.

This capability, the citation states, will greatly facilitate the movement of troops in a radiation area while minimizing their exposure to radiation, and will find extensive utilization in a civil defense context.

Dr. Kronenberg is chief of the Nuclear Hardening Technical Area of the Electronics Technology and Devices Laboratory at ECOM.

WEAPONS COMMAND, Rock Island, Ill. Gilbert J. Melow Jr., Robert E. Seamands, Robert L. Gritton and *Michael C. Nerhahl,* key members of the XM204 Howitzer Exploratory Development Team, were nominated for a group award for their major roles in developing techniques to successfully apply the Soft Recoil Cycle to field artillery.

As a result of their dedicated engineering effort, the pre-prototype XM204 Howitzer demonstrated definite military potential so that a substantial Advanced Development Program was approved and initiated.

Their achievement serves as an outstanding example of the "Fly Before You Buy" philosophy wherein feasibility is demonstrated before a large development program is started.

NATICK LABORATORIES. Leo A. Spano and *Vincent D. Iacono* were selected for their work in the development of a microclimate-controlled protective clothing system. It is designed for explosive ordnance disposal personnel when working with toxic munitions in hazardous environments, particularly in hot and hot-humid climates.

This clothing system is cited as giving the Army a "quantum jump" in personnel protection, extending the operational capability in toxic environments approximately tenfold.

Spano, a physical and biological administrator, is acting program manager for the Pollution Abatement Program at NLABS. Iacono is a physical scientist with the Advanced Projects Branch, Clothing and Equipment Systems Division, Clothing and Personal Life Support Equipment Laboratory at Natick.

Dr. Mary Mandels, a research microbiologist at the NLABS Food Laboratory, will receive an R&D Achievement Award for her critical contribution to development of an enzymatic process to convert waste paper and packaging into glucose syrup, sugar or ethanol, a clean-burning fuel, or a growth medium for simple cell protein production.

Listed by NLABS leaders as one of the installations' major achievements in 25 years, the process is acclaimed for its potential application to profitable disposal of waste and pollution abatement.

Dr. Mandel's work, the citation states, has provided a significant contribution to the science of enzymology, specifically to knowledge of fungal cellulases. For a detailed description of the process of converting waste paper into glucose and a feature on Natick Laboratory contributions to the process, see 1971 April-June, page 1, and July-August, page 10, issues of this magazine.

HARRY DIAMOND LABORATORIES, Washington, D.C. John R. Dent was cited in his award nomination for superior technical and managerial contributions to Army and military science —especially on the highly successful Camp Sentinal Radar III Project. The system has been made operational on an accelerated schedule and has been demonstrated to provide unprecedented foliage penetration performance.

MISSILE COMMAND, Redstone Arsenal, Ala. Joe Shelton's award selection stems from "one of the most outstanding accomplishments" in the field of electron tubes during 1971. He conceived and developed an electron emitter that requires no heat for operation. Electron emission is due to the electric field present in the electron tube.

Capable of operating at ambient temperatures and adaptable to configurations and sizes required for electron tubes, the emitter has been successfully demonstrated to make possible new families of electron tubes as well as improved existing tubes.

Shelton is assigned to the Advanced Research Projects Agency Support Office, Directorate for Research, Development, Engineering, and Missile Systems Laboratory at MICOM.

ABERDEEN (Md.) R&D CENTER. Mrs. Priscilla W. Kingman was recognized for her "exceptional application of basic knowledge to the development and use of new experimental and theoretical approaches" to understanding the structure of heavily deformed metals.

She was cited for developing the first proof of the existence of perfect, small crystalline structural building blocks of metal in alloys having high ductility; also, for obtaining the first experimental evidence of the existence of unique deformation structures in shock-loaded metals.

Her discoveries as a metallurgist with the Materials Application Group, Terminal Ballistics Laboratory, Ballistic Research Laboratories, AARDC, "have provided new and unique approaches" for the application of metals to Army weapons systems.

U.S. ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, Charlottesville, Va., Charles G. Huie's award

awards

nomination certifies his achievement in reverse engineering that has enabled the U.S. Army to develop the "Ribbon-Bridge." This tactical floating bridge has reduced erection time "by a minimum of 10-fold."

When a bridge section is placed in the water, it instantly unfolds to provide a 20-foot bridge bay with integral decking. Several bays can be joined across a stream at a rate of 20 to 60 feet per minute as against the former bridge-erection rate of 2 to 3 feet per minute.

CORPS OF ENGINEERS

CONSTRUCTION ENGINEERING RESEARCH LABORATORY (CERL), Champaign, Ill. Bobbie H. Gray, assigned to the Construction Materials Branch of CERL, is credited with opening up a whole new era of using fibrous concrete for airfield pavements. The first applications of this material (as related to the Corps of Engineers mission in support of Air Force construction) were placed and evaluated with unprecedented results.

Fibrous reinforced concrete, half the thickness of regular pavement, was placed in a test track and subjected to simulated loading of the C-5A military cargo plane. The fibrous concrete withstood twice as many load applications as regular pavement.

The potential benefits resulting from this test are directly related to airfield pavements, and "offer the first major and significant change in airfield pavements in 15 years." (For further information on fibrous concrete, see page 6 of March-April 1972, issue of this newsmagazine.)

ARMY MEDICAL DEPARTMENT

INSTITUTE OF SURGICAL RESEARCH, Brooke Army Medical Center, Fort Sam Houston, Tex. Drs. Arthur D. Mason and *Robert B. Lindberg* were selected as "key figures in the identification and documentation of burnwound sepsis as the major cause of death in patients with extensive burns."

The award citation states that they developed a reproducible laboratory animal model of the disease; also, discovered and developed an effective means of preventing this life-threatening complication of thermal injury through application of Sulfamylon.

Development of Sulfamylon burn cream has "significantly reduced the mortality resulting from burns. . . . Their work also has contributed to the national welfare by decreasing morbidity and increasing survival of the more than two million people burned annually in the United States."

SAFEGUARD SYSTEM COMMAND

SAFEGUARD SYSTEM OFFICE, Arlington, Va. John J. Shea, assistant technical director (reentry physics), Directorate for Test and Evaluation, was assigned the responsibility for insuring that the vulnerability to nuclear weapons effects of the Safeguard ABM System was minimized.

The award citation credits him with identifying the problem, forming working groups of experts, and personally directing their efforts in finding solutions in the areas of transient radiation effects on electronics, nuclear-induced ground shock, electromagnetic pulse phenomena and missile structure vulnerability to nuclear effects.

Through his efforts, "vunerability of Safeguard components has been identified and the components have been redesigned to reduce these vulnerabilities within schedule and monetary constraints."

His efforts also were "in large part responsible for the recently published Safeguard Hardness Test Plan." This has been cited as an example for use by other project managers with similar nuclear effects problems.

OFFICE, CHIEF OF R&D

LAND WARFARE LABORATORY, Aberdeen Proving Ground, Md. Robert P. McGowan was selected for his professional knowledge and ability to produce original concepts for practical items of hardware which have improved Army mobility.

Diversity of his accomplishments, his nomination states, includes the development of a personnel/cargo-lowering device, high-speed utility helicopter hoist, hard-top enclosure kit for the M-151 vehicle, pulsed-water jets, vehicle-locking device, vehicle heaters, and the XR-311 high-mobility wheeled vehicle.

ADVANCED BALLISTIC MISSILE DEFENSE AGENCY, Huntsville Office, Hunstville, Ala. Charles W. Mead was selected for his leadership in directing an in-house engineering group performing systems analysis and systems effectiveness of advanced ballistic missile defense components and their deployment.

"Under his guidance," the nomination says, "computer simulations have been developed to model parametrically all BMD components such as interceptors, radars and the data processor." From these simulations, system parameters and their effectiveness can be established and a wide range of deployments can be measured. The simulations are adjusted to counter current or projected threats. These simulations are documented and used as analysis tools by other government agencies."

Mead is employed as a general engineer in the Advanced Systems Division of ABMDA.

Charles R. Vick has distinguished himself with ABMDA's award, the citation states, by "outstanding scientific and engineering leadership" of the Processing System Analysis Program.

This program is credited with developing advanced commercial computers for real-time ballistic missile defense application. Capability demonstrations resulted in selection of the Site Defense of Minuteman (formerly Hardsite) data processing hardware and software approach.

Vick supervised the formulation of the methodology for developing ballistic missile defense software on commercial computers—from computer independent specifications through process design, implementation, testing and validation. The citation says:

"His over-all effort has resulted in a major contribution to the state-of-the-art in ballistic missile defense data processing development."

New Publication Describes Magnesium Research Center

A new descriptive booklet familiarizes the research community with the Magnesium Research Center (MRC) at the Columbus (Ohio) Laboratories of Battelle.

Established this past January, the center is staffed to serve the research needs of the magnesium industry in physical metallurgy and applications development on a contract basis.

The 16-page illustrated booklet describes MRC capabilities in such areas as die casting process development; melting and casting research; corrosion, finishing, and electrochemical applications; physical metallurgy and fabrication research; and magnesium economics research. In addition, it covers contract research procedures.

Single copies of the booklet, titled "The Magnesium Research Center," are available without charge from: The Publications Office/Columbus Laboratories of Battelle, 505 King Ave., Columbus, Ohio 43201.

3 HumRRO Reports Available In Microfiche and Standard Form

Three reports from the Human Resources Research Organization (HumRRO) are being offered for sale to the general public in microfiche form and as publications by the National Technical Information Service.

TR71-18, "Preliminary Handbook on Procedures for Evaluating Mental Health Indirect Service Programs in Schools," is carried under control number PB-210 091. Paper copy, $5.45; microfiche, 95 cents.

TR72-1, "An Occupational Clustering System and Implications for the Comprehensive Career Education Model," is carried as PB-210 089. Paper copy, $4.85; microfiche, 95 cents.

TR72-13, "Development of a Program of Instruction for WIN Employability Orientation," carried as PB-210 090, sells for $6.00 per paper copy; microfiche, 95 cents.

Army Judges Select 22 in ISEF . . .

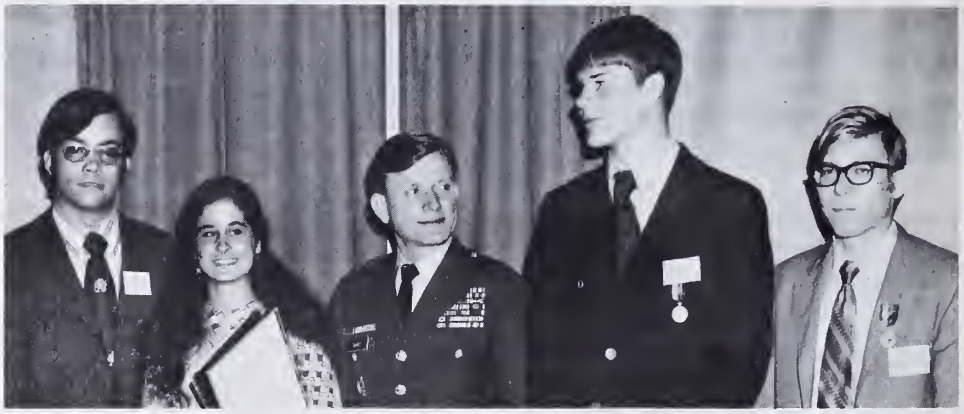
11 Superior, 11 Meritorious Award Winners Receive Expense-Paid Visits to or Jobs in Army Laboratories

Twenty-two winners of Department of the Army Superior and Meritorious Achievement Awards were selected from 376 finalists in the 23d annual International Science and Engineering Fair in New Orleans, La.

Included were two chosen as winners of the "Operation Cherry Blossom" trip to the Japan Student Science Awards Exhibit in Tokyo next January and as U.S. Army representative in the Nobel Prize Ceremony in Stockholm, Sweden. The latter is a new honor for students selected by the U.S. Army, Navy and Air Force in the ISEF.

Sponsored by Science Service, a nonprofit institution whose objective is to popularize science, the annual ISEF culminates competition among high school students in more than 200 affiliated local, state and regional fairs, including many in foreign lands. In the U.S., financial support also is provided by a large number of professional scientific societies and major industries.

Finalists at New Oreleans represented 46 states, Puerto Rico, Canada, Japan and Sweden. Exhibits of their research projects encompassed behavioral and social sciences, biochemistry, botany, chemistry, earth and space sciences, engineering, mathematics and computers, medicine and health, microbiology, physics and zoology.



ARMY ISEF Special Award Winners, flanking Director of Army Research BG Charles D. Daniel Jr., are (from left) William W. Sager, alternate winner for Cherry Blossom Operation; Claire Mary Fritsche, winner of Cherry Blossom trip to Japan; Harold J. Loveridge, winner of Nobel Prize ceremony trip to Sweden; alternate David Rudman.

Army winners were selected by 24 judges, including 11 Army Reserve officers affiliated with research and development activities.

Director of Army Research BG Charles D. Daniel Jr. presented awards to the Army's 11 Meritorious and 11 Superior Award winners, in the form of Certificates of Outstanding Achievement signed by the Secretary of the Army and a framed photographic reproduction of the U.S. Army Medallion of Scientific Achievement Award, a new honor.

The U.S. Army, Navy and Air Force have alternated as executive agents in sending ISEF selectees to "Operation Cherry Blossom" since the Japan Student Science Awards Exhibit was initiated in 1963 under sponsorship of the Japanese newspaper, *Yomiuri Shimbun.*

Under a new program inaugurated in 1972, Army, Navy and Air Force representatives selected at the ISEF will be sent to the Nobel Prize ceremonies in Stockholm. Expected to be an annual event, this program will permit participants to witness ceremonies and meet some of the science laureates.

The Army selectees for the trips to Tokyo and Stockholm also will receive checks for $100 from the Association of the U.S. Army.

Claire Mary Fritsche, 17, Nicolet High School, Milwaukee, Wisc., won the "Operation Cherry Blossom" trip in addition to an Army Superior Award and an Honorable Mention Award from the Eastman Kodak Co. Her exhibit was titled "Prevent-

ARMY JUDGES, representative of the numerous organizations making awards at the 23d International Science and Engineering Fair in New Orleans, La., included (front row, 1. to r.) Dr. Gordon L. Bushey, U.S. Army Materiel Command; Jed Henderson Jr., U.S. Army Engineer District, New Orleans; Dr. David Bass, U.S. Army Research Institute of Environmental Medicine, Natick (Mass.) Laboratories (NLABS); Dr. J. Fred Oesterling, NLABS; Dr. Durwood Rowley, NLABS; John Barry, Deseret (Utah) Test Center. Back row, 1. to r., are Dr. Fred Stemler, Biomedical Laboratory, Edgewood (Md.) Arsenal; LTC Michael W. Hannegan, Walter Reed Army Institute of Research; Dr. Richard L. Hartman, Missile Systems Laboratory, Redstone (Ala.) Arsenal; Dr. Lynn E. Baker, U.S. Army Research Office; Claire Lieske, Edgewood Arsenal. Judges not shown are Richard Ahlvin, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.; Harry Lowe, Office of the Chief of Engineers, Headquarters, Department of Army.

ing Ozone-Induced Injury of 'P. vulgaris' With Alpha Tocopherol." The research project was designed to verify and prevent ozone-induced injury to P. vulgaris L. var. humilis Alef. leaves through external application of dl alpha tocopherol (phosphoric acid ester disodium salt).

Following graduation this year, Miss Fritsche plans to attend Iowa State University to study medicine. She plans to become a physician.

An escort officer will accompany Miss Fritsche and Corey Jon Mullins, 18, Merritt Island (Fla.) H.S. to the Japan Student Science Awards Exhibit. Mullins was selected by General Motors Corp., which is participating in Operation Cherry Blossom for the first time. Mullins was selected for an exhibit titled "An Inorganic Ion-Exchange Membrane for Desalination of Water."

Harold J. Loveridge, 17, from Southwestern High School, Lafayette, Ind., was selected to represent the Army at the Nobel Prize ceremonies. He also won a Superior Award from the Army, a Certificate of Achievement for an outstanding exhibit related to nuclear science, and an Honorable Mention Award from the Eastman Kodak Co. for outstanding use of photography in a science project.

Loveridge's medicine and health exhibit was titled "A Study on the Restoration of X-Irradiation Damaged Lymphoid Tissues in Mice, using Deoxyribonucleic Acid."

A member of the National Honor Society and a 1972 Outstanding Teenager of America, he plans to attend medical school at Purdue University.

William Warren Sager, 17, John Handley High School, Winchester, Va., was chosen as the Army alternate representative at the Japan Student Science Awards Exhibit. Sager also received a Superior Award for his earth and sciences exhibit titled "Photographic Study of Galactic Star Clusters."

David A. Rudman, 17, Bloomington (Ind.) Senior H.S., was chosen as alternate Army representative to attend the Nobel Prize ceremonies if Loveridge is unable to make the trip. His Army Superior Award chemistry project was titled "Crystallographic Structure of a Ligand Compound."

OTHER ARMY SUPERIOR AWARDS. *Murray W. Hitzman,* 18, College H.S., Bartlesville, Okla., for "Cultural Architecture of the Anasazi"; *Gregory M. Pfister,* 17, Wahpeton (N.D.) Senior H.S., for "A Mechanism for the Diels-Alder Reaction Based on Isomerization"; *William B. Hobbs,* 16, Moultrie (Ga.) H.S., for "Experimentation and Photography in a Supersonic Wind Tunnel"; *Ken Housley,* 16, Pocatello (Idaho) H.S., for "PHAS II: Program Home Alarm System."

Van J. Wedeen, 16, Midwood H.S., New York City, for "Automation of Differential Equations"; *Janice R. Gwin,* 18, Palacios (Tex.) H.S., for "Mystery Element Found in Cystic Fibrosis Secretions"; *Harold E. Caldwell,* 18, Northwestern H.S., Flint, Mich., for "Training of an Artificial Neuron Net."

MERITORIOUS AWARDS. *Jon S. Mattson,* 17, John S. Battle H.S., Bristol, Va., for "Lactrodectus mactans: Its Behavior Growth and Development"; *Clarissa A. Geigel,* 16, Notre Dame H.S., Caguas, P.R., for "Grasshopper: A New Source of Protein for Mankind? "; *Sachie Ichinohe,* 18, Aomori Nishi H.S., Aomori-ken, Japan, for "A New Colorimetric Method for Iron"; and

Marshall S. Collins, 17, Woodrow Wilson H.S., Beckley, W. Va., for "Analyzing Atmospheric Refraction and Ionospheric Inhomogeneities at Different Latitudes"; *John S. Fedyna,* 17, Bergenfield (N.J.) H.S., for "Development of an Ultra High-Speed Stroboscope"; *Arvind Narain Srivastava,* 15, Poudre H.S., Fort Collins, Colo., for "Characteristics of a Finite Universe"; and

Susan Lee Dziengiel, 17, William Howard Taft H.S., Chicago, Ill., for "Regression of Induced Ehrlich Ascites Carcinoma in Mice"; *Lyn Rika Ream,* 18, Joel E. Ferris H.S., Spokane, Wash., for "Oxygen Depletion Effects on Chlorophyta Population in the Spokane River"; *Robert C. Melville,* 18, Bel Air (Md.) Senior H.S., for "A Dry Ice Screamer"; and

Don B. Destephano, 17, Moultrie (Ga.) H.S., for "Investigation of the Physiological Properties of Insect Hormones and Pheromones"; *Gail M. Uyemura,* 17, Kaimuki H.S., Honolulu, Hawaii, for "Crassostrea virginica Mariculture in Molii Fishpond."

Administrative arrangements for the ISEF were coordinated by Science Service Director Edward G. Sherburne Jr. and Mrs. Dorothy Schriver, assistant director.

U.S. Army participation in supporting ISEF was arranged by Mrs. Anne G. Taylor of the U.S. Army Research and Development Information Systems Office, Office of the Chief of Research and Development. COL Sidney L. Loveless (USA, Ret.) was Reserve officers' coordinator.

Dr. J. Fred Oesterling, deputy scientific director for research, U.S. Army Natick (Mass.) Laboratories, was chairman of the Army judges' panel; Dr. Gordon Bushey, Army Materiel Command, was co-chairman.

ARMY RESERVE JUDGES included (front row, l. to r.) MAJ Kennard D. Fearing, CPT Salvador L. Camacho, COL Edwin M. Vaughn, COL Roy B. Mefferd Jr., MAJ John R. Montgomery, COL Sidney Loveless. Back row, l. to r., are CPT John D. Hwang, CPT Ronald D. Stricklett, COL John V. Perry Jr., MAJ Harold Zallen, MAJ John M. Taylor.

ENGINEERING EXCAVATION DESIGN, using a row of 1-ton and a row of 2-ton charges for a railroad cut at Trinidad, Colo., is shown at right. Photo above shows the resultant 500-foot-long cut after minimal shaping operations.

'Instant Excavation' . . .

By LTC Robert L. LaFrenz

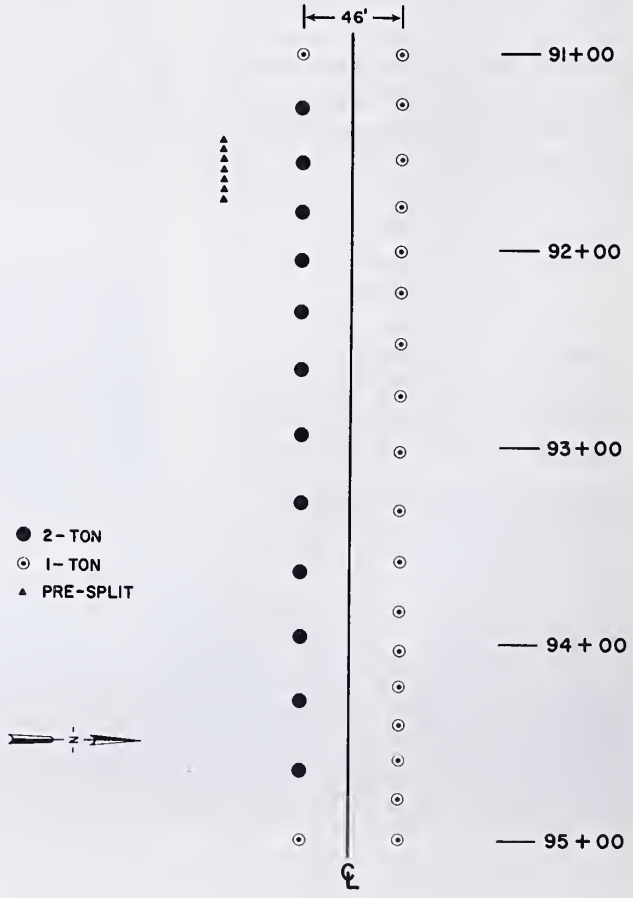
"Say, lieutenant, what do you call that, 'instant excavation?' I passed by here yesterday and there wasn't any road cut through that hillside. What are you engineers going to come up with next?"

Saving time, money and the environment are popular objectives in today's society—but seldom mutually obtainable. The Corps of Engineers, however, is in the process of developing a construction technique called "explosive excavation" which, on selected projects, promises all three goals simultaneously.

The approach is to bury a row or rows of large charges in a pattern and at the optimum depth to produce the desired excavation. Detonated either simultaneously or sequentially, the charges not only break up the material but also move it out of the excavation at the same time.

Emphasis is now on the use of chemical explosive charges in the range of 1 to 10 tons. Research was started on this technique by the Corps of Engineers and the Atomic Energy Commission in 1962, with the idea of using nuclear explosives.

Chemical charges were first used as modeling tools for planning the much larger nuclear detonations. Soon it became obvious that "chemical explosive excavation" was a technique worthy of development in its own right. The cratering or directed blasting development, where



the material is broken and moved by the same detonation, is the most spectacular form.

A parallel development termed "mounding," where large concentrated charges are used to fracture the material but retain it in the excavation, offers even greater economic advantages, however, in some situations.

Controlled blasting techniques can be used to minimize fracturing beyond the excavation boundary when the mounding technique is used for structural excavations.

The principal advantages of explosive excavation (dollar savings, speed of construction, and environmental advantages) have varying benefits on any specific project. The technique has been developed to the point where it is economically competitive with standard construction techniques on many projects. Indications are that savings of over 25 percent will be possible on some projects when the development is complete. Not only is speed of construction an advantage in some cases where weather, project necessity, etc., are critical factors, but the reduction in heavy earthmoving or dredging equipment requirements could also be significant to the overall environmental impact of a project.

Explosive excavation has been demonstrated on several full-scale projects to date. A 1370-foot long channel was produced in Montana. A small boat harbor was excavated in Hawaii. Three railroad cuts were executed at Trinidad, Colorado (one used simple cratering techniques, one was a mounding design, one utilized directed blasting concepts).

LTC Robert L. LaFrenz is the director of the U.S. Army Engineer Waterways Experiment Station Explosive Excavation Research Laboratory at Livermore, Calif. He is being reassigned as an associate professor in the physics Department at West Point in August.

Graduated from USMA in 1955, he entered graduate school in 1959 at Iowa State University at Ames, and earned an MS degree and doctorate. His major area of study for his PhD was civil engineering, with research in water filtration, and he minored in nuclear engineering and nuclear science. He is a registered professional engineer in civil and sanitary engineering.

He served at USMA as an instructor in the Department of Electricity (1963–65) and as an assistant professor in the Physics Department (1965–67). He was deputy director and then director of the Nuclear Cratering Group prior to its conversion to the Explosive Excavation Research Laboratory.

His military schooling includes the Airborne and Ranger Courses at Fort Benning, Ga., the Engineer Officer's Basic and Advanced Courses at Fort Belvoir, Va., and the Command and General Staff College at Fort Leavenworth, Kans.

His troop assignments include duty with the 317th Engineer Battalion (Combat) in Germany; 547th Engineer Float Bridge Company in Korea; and Engineer Section, First Field Forces, Vietnam.

LTC LaFrenz authored a technical paper presented on the subject of this article at the Army Science Conference at USMA, June 20–23.

In North Carolina, a channel "plug" was blown to connect a dredged channel with the ocean. Projects in progress include a road cut, spillway cuts, quarrying, and additional harbor development.

The development of explosive excavation offers important advantages to both the Army and private industry. In the construction industry, where hundreds of millions of dollars are spent annually on excavation, even a small-percentage saving would be significant—and explosive excavation offers much more.

Instant excavation" is actually the product of a decade of developmental effort initiated to carry out the U.S. Army Corps of Engineers portion of a joint agreement with the Atomic Energy Commission (AEC). The goal was to develop nuclear explosives for construction purposes.

Information gained from both civil and military research is integrated into the over-all development of explosive excavation. Insofar as the Army Corps of Engineers is concerned, the objective has been to apply explosive excavation to military engineering for combat purposes and to military construction, as well as to the Corps' more than $1.5 billion annual Civil Works construction program.

The AEC, through the Plowshare Division of the Lawrence Livermore (Calif.) Laboratory, has been responsible for developing nuclear explosives, conducting nuclear cratering experiments, acquiring nuclear safety information, and developing methods for predicting the size and shape of the craters.

In the joint venture, the Army engineers' role has involved corollary chemical high-explosive cratering experiments, participation in the AEC's nuclear cratering experiments, and development of project designs and engineering and construction data as a basis for nuclear cratering. Considerable research has been done to develop a chemical explosive configuration to simulate Atomic Demolition Munitions (ADM).

The Army Nuclear Cratering Group was formed in 1962 at Livermore, Calif., and is now known as the U.S. Army Engineer Waterways Experiment Station Explosive Excavation

(Continued on page 30)

EXPLOSIVE EXCAVATION of a plug to connect dredged channel into Atlantic Ocean.

'Instant Excavation' . . .

(Continued from page 29)

Research Laboratory (EERL).

Since 1969, the direction has been toward the development of both chemical and nuclear explosive excavation design techniques and engineering procedures which can be used on a wider range of civil engineering and excavation projects.

Flexibility and adaptability in design procedures, engineering practicability, and cost competitiveness with conventional excavation methods are the guidelines for current research.

Explosive excavation is on a downward cost trend. Although merely competitive with conventional excavation at this time on some projects, many technical advances are envisioned in the explosives methodology.

Two explosively excavated railroad cuts through a mountain in Trinidad served to point up a substantial cost advantage—an actual saving of $26,100 on a government reimbursement estimate of $84,400.

In a channel-widening project recently considered, the environmental advantages of blasting only once, rather than a long period of drilling and blasting followed by dredging, was deemed a very significant advantage by the Fish and Wildlife Department—since it would minimize disruption to the fish runs in the channel.

In some cases, explosive excavation offers a much safer and simpler approach, as proved in a project at Drum Inlet, N.C., where a plug connecting a dredged channel and the ocean was explosively excavated in one blast.

Environmental factors of ground shock, airblast and ejecta must always be evaluated when explosive excavation is used. To this list must be added radioactivity if the energy source is nuclear. Relatively accurate prediction techniques have been developed for these effects.

Ground shock and airblast can be reduced to relatively insignificant levels by sequential detonation of charges and rows. It has been found that a delay, in the millisecond range, between charges in a row has little effect on crater dimensions. However, this time-sequenced delay reduces ground shock and airblast effects to those of the largest single charge within the row.

Fish kill and ejecta distribution in an underwater detonation were originally considered as limiting factors in explosive excavation. However, experience has proved that these effects are not serious.

Although ejecta is spread over the marine bottom several hundred feet from a detonation, this disturbance is no greater than that caused by conventional excavation equipment. Fish kill is also limited to several hundred feet from the cratering detonation.

For example, on Project Tugboat, where 40 tons of explosives were detonated at one time, fish kill in positioned cages was limited to 300 feet from the point of detonation. The resultant entrance channel to the basin has a minimum width of 130 feet and the berthing basin, 300 feet square, is 12 feet below mean lower low water.

CURRENT EFFORTS. Studies and explosive excavation experiments ranging from laboratory-scale tests to major demonstration projects are being conducted by the Corps of Engineers' Explosive Excavation Research Laboratory Demonstrations on authorized Civil Works projects using project funds for the useful work accomplished.

Preliminary studies and investigations, and ancillary tests performed to develop more effective techniques and procedures, and to reduce costs, are funded with Civil Works general investigations funds under the Rapid Excavation with Explosives Program.

Military related research is conducted to meet approved requirements under sponsorship of the Office of the Chief of Engineers, the Defense Nuclear Agency (formerly DASA), or other military agencies. Civil and military research are integrated whenever feasible for overall economy.

Explosive excavation design and related services, or research work for Corps of Engineers Divisions and Districts or other agencies (National Aeronautics and Space Administration, Federal Aviation Agency, Bureau of Reclamation, State agencies or private industry) are conducted on a reimbursable basis.

Future research will continue to emphasize developing techniques for further reductions in costs. When this reducing cost trend is compared with the rising cost trend of conventional construction excavation, the promise of significant savings in both time and money is evident for many future excavation projects.

The development of chemical explosive excavation and its acceptance as a commonly used construction technique will also be a major step toward the acceptance of nuclear explosive excavation.

SCIENTIFIC CALENDAR

21st Annual Denver Conference on Applicotions of X-Roy Anolysis, Denver, Colo., Aug. 2–4.

3d Internotionol Conference on Atomic Physics, sponsored by ARO-D, ONR, NSF ond IUPAP, Boulder, Colo., Aug. 7–11.

Cryogenic Engineering Conference, sponsored by the Cryogenic Society of Americo, Boulder, Colo., Aug. 9–11.

Conference on Numericol Anolysis, sponsored by ARO-D, Dublin, Eire, Aug. 14–18.

Cosmochemistry Conference, sponsored by the Internotionol Associotion of Geochemistry and Cosmochemistry, Combridge, Moss., Aug. 14–18.

Combustion Conference, spansored by the Pennsylvonio Stote U., University Pork, Pa., Aug. 20–25.

13th Internotional Conference on Low Temperature Physics, sponsored by ARO-D, NBS ond U. of Colorodo, Boulder, Colo., Aug. 20–26.

Liquid Crystols Conference, sponsored by the Liquid Crystol Institute, Kent, Ohio, Aug. 21–25.

Hydrogen Bonding Conference, sponsored by Notionol Reseorch Council of Conodo, Ottawa, Conodo, Aug. 21–25.

Extended Atmospheres and Circumstellor Motter in Spectroscopic Binory Systems Conference, sponsored by IAU, Victorio, B.C., Conodo, Aug. 21–25.

6th Trienniol Conference of the Internationol Federotion of Operotional Research Societies, Dublin, Eire, Aug. 21–25.

4th Internationol Congress of Histochemistry ond Cytochemistry, Kyoto, Jopon, Aug. 21–25.

Physics of Dense Motter Conference, sponsored by IAU, Boulder, Colo., Aug. 21–26.

24th Internotionol Geological Congress, Montreol, Conodo, Aug. 1–Sept. 1.

Processing for Adhesives Banded Structures Meeting, sponsored by AMC, Air Force and Navy, Hoboken, N.J., Aug. 23–25.

Internotional Unian of Crystollogrophy Meeting, Kyoto, Jopon, Aug. 26–Sept. 7.

Electronic, Opticol ond Mognetic Materiols, spansored by AIME, Boston, Moss., Aug. 28–30.

Spectral Lines Conference, sponsored by APS, Schenectody, N.Y., Aug. 28–Sept. 1.

Few-Particle Problems in Nucleor Interoction Conference, sponsored by IUPAP, NSF, AEC, U. of Californio, Los Angeles, Colif., Aug. 28–Sept. 1.

Electron Microscopy Meeting, sponsored by Electron Microscopy Society of America, Los Angeles, Calif. Aug. 28–Sept. 1.

Quantum Chemistry and Solid-Stote Physics Conference, sponsored by U. of Uppsolo and U. of Florido, Beitastolen, Norwoy, Aug. 30–Sept. 3.

Powder Metollurgy far High Performonce Components Conference, sponsored by AMC, Raquette Lake, N.Y., Aug. 31–Sept. 3.

SPEAKING ON . . .

(Continued from inside front cover)

We must sharpen and focus the lines of responsibility, make clear the decision points, that transform a written materiel requirement into materiel in the hands of the troops. Managers, practices, procedures and attitudes which exercise no function but that of delay must be reformed or removed.

Our history as a Nation is filled with the successful conquest of the challenge of time. The construction of the *USS Monitor* in 1862 is a case in point. In September of 1861, Union spies discovered work progressing on the ironclad "Merrimack" in the Confederate held shipyards at Norfolk, Va. This event caused great consternation in the North and joy in the South for it was quickly realized that such a weapon might decide the course of the war.

With the intelligence information it had gathered, the Navy sent an invitation to contractors based on:

- The ship desired to meet the threat was to have minimum draft since it would operate in shallow waters.
- Protection against gunfire from enemy artillery or fixed fortifications was necessary. Thus, by inference, there was a requirement for a low silhouette.
- The last requirement was for a capability to point guns at a target when the ship could not be maneuvered. This led to a requirement for a revolving turret.

Within 10 days of this publication, an idea, that of the Swedish inventor, John Ericsson, was selected and work was begun on the "Monitor." What is important to remember in this case is that materiel need definition, development and production were conducted expeditiously enough to meet the threat. The "Monitor" was able to engage and neutralize the "Merrimack" before it could destroy the Union blockade.

The organization which performed the AMC functions of that day met the challenge of time. The proof of that organization's success—again as always—can be seen in terms of combat effectiveness.

Throughout the Army today, we face the same challenge of time in materiel development. No manager at any level can afford to squander it. We race not only against would be "Merrimacks" but against the accelerating pace of our own technology.

I urge you, the leaders of AMC, to continue your individual and collective efforts, to conserve time in each action which supports the definition, development, procurement or production of an item of Army materiel.

For its part, the Army staff has recognized the problem and is improving the procedures that will aid your efforts. These procedures will rationalize the missions of existing organizations whose job is to speed materiel development.

I have no doubt that the new procedures will be well developed and well thought out. They will remain only good intentions with little chance of success, however, unless they have your support, interest and involvement. I urge you to study these new directives carefully when they are published. Formulate your own plans to make them effective in the area of your responsibility. . . .

The second problem of the three that challenge us is that of technological trade-off. This problem, just as the problem of time, concerns not only AMC but all of the Army. In an age which may be mildly referred to as one of technological avalanche, what is technically possible to add to a piece of equipment or a weapons system, may not be desirable when we consider the development-to-delivery time, the dollar costs, and the opportunity costs —in terms of sacrifices we must make in other programs and systems to pay for the innovation.

A great deal has been written about the evils of "gold plating," of "over-engineering," of the incorporation into our weapon systems of self-defeating and unnecessary gadgetry. It is difficult to fix responsiblity for such problems. A materiel need written in response to the requirement of a field commander—turned over to committees at various echelons in our developmental process—tends to get quickly out of hand. It is the path of least resistance to add what the state-of-the-art can to a new proposal.

Reversing the trend is difficult. It requires managers with both great competence and great bravery to strike from a program those items which are nice to have but which detract from the requirement that all of our equipment be *combat oriented, maintenance oriented, have low support and training costs at all echelons*—in short, be effectively lean and mean.

In this field of managing technological trade-off, we must also take a closer look at the choices we make between product improvement, and "cast off and start again" type development.

It is quite often cheaper and more desirable, from a maintenance standpoint as well as a training standpoint, to employ what I would call the "Volkswagen" concept of materiel management—in which we take a combat-proven product and improve on it from year to year. This evolutionary rather than revolutionary method of materiel development is going to assume greater importance for us in an age of tightened belts and reduced budgets.

Such a concept has both merit and necessity and you, the AMC managers, must help make it effective and real.

The third problem I wish to discuss with you today has had a lot of attention in recent years. It is the problem of testing. Here, no less than in the areas of time and technological trade-off, we need your innovative support.

It is an understatement to say that we in the Army have worked hard in this field. We have many different tests developed over the years that ask specific questions which test the endurance and performance of materials, components, systems and subsystems. We have recognized that this testing program has "grown like Topsy" in response to challenges and difficulties we experienced at different times in our history.

We are now in the process of revising and refocusing our testing program. The goal of that effort is a recognition, in practice, that every materiel, subsystem and system test must answer one key question: How does it perform in combat, with typical troops, under less than ideal conditions of weather, terrain and maintenance support?

Your job, the job of the materiel manager, directing or analyzing test results, must be one of reconciliation.

The engineer's view of a perfect item of equipment, as you well know, is going to be different than that of the combat commander who operates in a vastly different and more complex environment. Our testing program must have a sound engineering base with a well understood objective of combat effectiveness. . . .

What I would ask of you is that, within limits of your responsibility and influence, you vigorously attack the problems we have discussed today—the key problems of time, technological trade-off and testing.

Only through your innovation, and the innovation you encourage in your subordinates, can we meet the larger goals of keeping our Army great and our Nation great—of providing the American soldier with the best equipment, in the shortest possible time, with an optimum application of technology. I wish you success in meeting these goals.

15th Annual Ceremony Honors Achievements In Science, Technology, Leadership, Support

Winners of the 15th annual Commanding Officer's Awards at the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., are an analytical chemist, a supervisory engineering technician, a budget analyst, and a chief of a field test office.

Presented May 19, the awards honored Frank L. Harris for scientific achievement, James A. Dennis for technological achievement, James Campbell Jr. for administrative/technical support, and Edward J. Schultze for leadership.

Selected from 20 nominees, including two women, the winners received a certificate, a plaque-mounted medal, and a $50 cash award. All nominees received certificates and cash awards through the Army Incentive Awards Program.

BG John C. Raaen Jr., commanding general of the U.S. Army Mobility Equipment Command, St. Louis, Mo., was guest speaker at the outdoor cere-

awards

MERDC Commanding Officer's Awards winners, shown with dignitaries who participated in the program at Fort Belvoir, Va., include (front row, from left) Frank L. Harris, scientific achievement award; James A. Dennis, technological achievement; James Campbell Jr., administrative/technical support; Edward J. Schultze, leadership. Second row, from left, are Dr. K. C. Emerson, Assistant for Research, Office of the Assistant Secretary of the Army (R&D); Turner G. Timberlake, Associate Deputy for Engineering, MERDC; Norman L. Klein, Assistant Deputy for Laboratories, U.S. Army Materiel Command; COL Bennett L. Lewis, Commander of the Mobility Equipment R&D Center.

Scientific Achievement Nominees

Robert A. Rhodes Jr.

Abram Leff

Amos J. Coleman

Technological Achievement Nominees

John M. Karhnak Jr.

Virginius Rodes

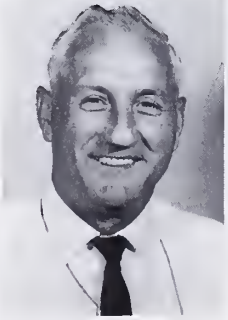
Eberhart Reimers

Administrative/Technical Support Nominees

Agnes A. Taylor

Guy M. Moose

Walter C. Pierce



Melvin J. Albright

Wesley L. Yeater

Helen Nicholson

monies, which permitted attendance of a large crowd to honor the award winners. Invocation and the benediction were given by Chaplain (LTC) Teddy R. Pope Jr., Fort Belvoir, Va.

SCIENTIFIC ACHIEVEMENT. Dr. K. C. Emerson, Assistant for Research, Office of the Assistant Secretary of the Army (R&D), presented the scientific award to Harris. He was cited for "advancing the state-of-the art on the effects of extraneous materials in the spectrographic discharge."

Application of this concept to copper base alloys for the quantitative determination of trace consitutents has resulted in an improved point-to-plane technique. Based on the experience with the copper base alloys, the extraneous effects concept has been extended to stainless steels and other alloy groups.

As a result of this work, the citation states, the applicability of emission spectrography, with its inherent advantages of sensitivity, accuracy and rapidity, to the solution of commodity related in-service problems as well as to a variety of other failure analysis problems, has been considerably increased.

Harris received a BS degree in chemistry from Howard University in 1954 and entered Civil Service in 1955 as an employe of the National Institutes of Health. In 1956 he transferred to the R&D Center and is now employed in the Materials Research Division of the Military Technology Department.

Abram Leff, Amos J. Coleman and Robert A. Rhodes Jr. also were nominated for the Scientific Achievement Award.

Leff was entered by the Countermine /Counter Intrusion Department for his contributions to the construction of precision microwave measurement systems; also, for the early application of these systems for measuring and analyzing the complex microwave response of buried metallic and nonmetallic mines.

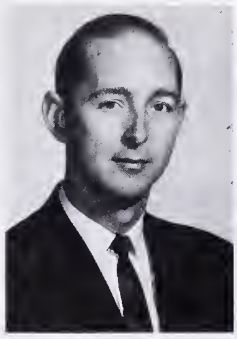
Coleman, the Electrotechnology Department's nominee, was cited for developing a new technique for the study of electro-chemical processes employing hydrogen-deuterium exchange to investigate electrode reactions. This required successfully interfacing a digital computer with a mass spectrometer.

Rhodes, who won the Technology Award in 1968 for his work on environmental control units, was nominated this year by the Mechanical Technology Department for his work on two scientific research projects.

The justification for the nomination cited him for a versatile computer design program and for designing an "unprecedented mercury heat pipe" expected to result in life-cycle cost-reduction in future military heater development; also, for significant advances in the electrostatic propulsion of air, which has potential for future replacement of fans by silent, reliable ionic airflow devices.

Leadership Nominees

Donald W. Keehan



Henry A. Atkinson

Paul D. Hopler

Ivan M. Silver

TECHNOLOGICAL ACHIEVEMENT. Norman L. Klein, Army Materiel Command Assistant Deputy for Laboratories, presented the technology award to Dennis, one of four nominees. He was cited for advancing the state-of-the-art of fuel-air explosive technology and land-mine neutralization by blast overpressure. His instrumented measurement of blast effects from such explosions "have generated 6300 data points, which quantify many previously unknown factors" and fill many of the known voids in fuel-air explosive technology.

Dennis served in the Army from 1939 until his retirement as a lieutenant colonel in 1960. Employed at the R&D Center for 11 years, he is currently working in the Mine Neutralization Division of the Countermine/Counter Intrusion Department.

Other technological achievement nominees were Eberhart Reimers, Electrotechnology Department, for work in advancing the technology of solid-state power switching devices; John M. Karhnak Jr., Mechanical Technology Department, for improving hydraulic filtration by expanding the basic theory relating to component degradation; and Virginius Rodes, Military Technology Department, for accomplishment in testing and developing the ribbon bridge.

ADMINISTRATIVE/TECHNICAL SUPPORT. Turner G. Timberlake, associate deputy for Engineering at the R&D Center, presented the Gelini Medal to Campbell, who was selected over six other nominees.

Initiated in 1971, the medal honors the late COL Walter C. Gelini, commanding officer of the center when he died in May 1970.

Campbell was cited for outstanding work during the period when the Engineering Laboratory was disbanded and functions were transferred to other research and development departments. His work resulted in the development and implementation of "highly effective courses of action which, in turn, effected far-reaching improvements."

Campbell served in the Army from 1942 until his retirement as a lieutenant colonel in 1964. He joined the MERDC in 1965 and is presently employed in the Program Budget Division, Office of the Comptroller.

Other nominees for administrative/technical support were Mrs. Helen Nicholson, Countermine/Counter Intrusion Department; Walter C. Pierce, Electrotechnology Department; Melvin J. Albright, Mechanical Technology Department; Wesley L. Yeater, Technical and Research Support Office; Guy M. Moose, Systems Engineering and Computation Support Office; and Mrs. Agnes A. Taylor, Military Technology Department.

LEADERSHIP. COL Bennett L. Lewis, MERDC commander, presented the leadership award to Edward J. Schultze for his achievements as chief of the "ribbon bridge" field test office. Under MERDC development, the bridge was tested at Fort Lewis and Skagit River sites in the State of Washington.

Schultze entered Civil Service in 1941 and was employed at the Rock Island, Ill., District Office of the Corps of Engineers for 10 years except for service in the Army Air Force in 1943-45. He transferred to the forerunner of the MERDC in 1952 and is now employed in the Marine and Bridge Division, Military Technology Department.

Other leadership nominees were Ivan M. Silver, Electrotechnology Department, for leading his group to "numerous superior technical accomplishments in the electrical power field"; Henry A. Atkinson, Systems Engineering Division, Systems Engineering and Computation Support Office; and

Paul D. Hopler, chief of the Systems and Components Branch, Mechanical Equipment Division; and Donald W. Keehan, Countermine/Counter Intrusion Department, for organizing and directing technical activities during a period of major program expansion and department reorganization.

awards

MERITORIOUS SERVICE MEDAL. *LTC Dan J. McBride,* MSC, military concepts and doctrine officer in the Health Systems Doctrine and Analysis Division of Plans, Supply and Operations Directorate, was recently awarded the Meritorious Service Medal (MSM).

The award was made in recognition of his prior service as commanding officer of the 1st Medical Battalion, 1st Infantry Division at Fort Riley, Kans.

COL Joseph A. Pastore, chief of the U.S. Army Health Services Data Systems Agency, received the second award of the MSM in recognition of his services as chief of the Ser vice Division, executive officer and commanding officer of the U.S. Army Medical Depot, Ryukyu Islands and director for Logistics, U.S. Army Medical Center, Ryukyu Islands from 1969 to 1971.

LTC Ramon P. Minx, MSC, received a first Oak Leaf Cluster to the MSM at his retirement ceremony. He had served as a radiation biologist, detailed to the Army's Presidential Support Detachment since December 1970. BG Manley G. Morrison, chief of the Medical Service Corps, presented the award.

LTC George J. Martin, chief of the Configuration Support Division of the Office of the Deputy for Management Systems, U.S. Army Computer Systems Command, was awarded the MSM.

The presentation recognized his planning, directing, controlling and coordinating activities relating to the development of multicommand management information systems.

EXCEPTIONAL CIVILIAN SERVICE. *Roy G. Huffman,* assigned to the U.S. Army Computer Systems Command, Fort Belvoir, Va., received the Army's highest civilian award, the Decoration for Exceptional Civilian Service, for his significant contribution "in the development and installation of the Major Army Subordinate Command Management Information System (ASMIS) from November 1969 to April 1971."

The citation reads: "Through his outstanding leadership, sound judgment and exceptional ability, the redesigning and reprograming of the Active Army Personnel System was accomplished in the Headquarters of the Continental Army Command and three major overseas commands."

The award citation credits him with "large-scale savings to the Department of the Army and major advances in the Personnel and Force Accounting Automated Reporting System."

MERITORIOUS CIVILIAN SERVICE. *William Eppler,* Picatinny Arsenal, Dover, N.J., received the Meritorious Civilian Service Award for his work as chief of the artillery ammunition laboratory, particularly in connection with artillery and mortar ammunition for U.S. combat forces in Southeast Asia.

The commendation says his "creative technical guidance was responsible for several outstanding engineering feats in these areas."

Albert Nash, chief of the Fuze Engineering Laboratory at Picatinny Arsenal, received the Meritorious Civilian Service Award for his work in "providing improved and less costly fuzing systems covering the spectrum of conventional munitions for our combat forces in Southeast Asia . . . (his) creative professional guidance and innovations were responsible for several outstanding production feats in the fuzing technology area."

John A. Ward, an internationally known veteran parachute engineering technician at the U.S. Army Natick Laboratories, was recently presented the Army's second highest honor for civilian employes, the Meritorious Civilian Service Award.

The citation states, in part: ". . . his contributions . . . significantly improved the combat effectiveness and safety of airborne, Special Forces and Ranger elements of the U.S. Army . . . (and) exceptionally outstanding performance and achievements in the testing and development of personnel parachutes and associated airdrop equipment."

During 28 years of active military duty and 12 years as a civilian technician until his recent retirement, Ward gained international recognition for his expertise in the field of aerial delivery.

DISTINGUISHED SERVICE MEDAL. *BG Wilson M. Osteen,* retiring recently following nearly 30 years of active military duty, was awarded the Distinguished Service Medal.

Assistant to the Surgeon General for Veterinary Services, BG Osteen was presented the award in a formal ceremony presided over by the Surgeon General of the Army, LTG Hal B. Jennings Jr.

BG Osteen, who had also been chief of the Veterinary Corps, earned his doctor of veterinary medicine degree at Kansas State University, in 1935.

LEGION OF MERIT. *BG George M. Snead Jr.,* deputy CG of the U.S. Army Strategic Communications Command (STRATCOM), was awarded the Legion of Merit for his outstanding professional ability as director of Army Research, a position he held before joining STRATCOM.

COL Donald E. Archer and *COL Ralph W. Wofford,* formerly assigned to the Office of the Surgeon General, were awarded the Legion of Merit. COL Archer was chief of the Budget Group in Resources Management and COL Wofford was the Staff Judge Advocate for the Surgeon General.

The Chief of Logistics and Facilities Division of the Army Medical Department, *COL Jesse N. Butler,* received the third award of the Legion of Merit during his recent retirement ceremony.

COL Butler, who completed 30 years of military duty this year, headed the Logistics and Facilities Division since July 14, 1969.

COL Bradford L. Smith, former special assistant to the deputy for engineering, U.S. Army Computer Systems Command, received the Legion of Merit for exceptionally meritorious achievement, on the eve of his recent retirement from the Army.

With the command since its inception, COL Smith was lauded for his "extreme awareness and outstanding knowledge of rapidly changing developments and requirements during the period of organization of the newly created command."

Chief of Research and Development LTG William C. Gribble Jr. presented the Legion of Merit to COL William J. Lynch, who recently retired as commanding officer of the Army Research Office, Durham, N.C.

WSMR S&E Program Member Cited for Saving U.S. $5,000

Technical skill that saved the U.S. Government more than $5,000 has earned SP4 Gayland D. Page, a participant in the Army's Scientific and Engineering Program for Enlisted Men, a "Special Act or Service" award at White Sands Missile Range.

A search of available Army Incentive Awards Program records indicates this is the first award of its kind to an enlisted man at the New Mexico installation.

Specialist Page was cited for "initiative and devotion to his assigned task, (that) coupled with his high level of technical competence, resulted in a substantial technological advance in the development of the ranging and tracking system."

WSMR officials assigned Specialist Page to the task of repairing an experimental ranging and tracking system, deciding on this action as an alternative to extending a civilian contract an estimated 1½ man-months. His Military Occupational Specialty (MOS) is Electrical-Electronics Engineering Assistant.

LTC Russel V. Low, WSMR director of instrumentation, presented SP4 Page with a check for $350 in addition to the award citation. Page is 24 and a graduate from Lamar State College of Technology with a BS degree in electrical engineering.

People in Perspective . . .

Army Scientist's Father Draws Acclaim From Many Leaders on 100th Birthday

When internationally renowned Prof. Floyd Rowe Watson was honored on his 100th birthday as the oldest alumnus of the University of California at Los Angeles (UCLA), two of his sons, also distinguished scientists, were among 300 at the banquet.

Until he retired at the age of 95, Dr. Watson remained active as a consultant for the acoustical design of more than 1,000 buildings throughout the world. Sharing his pride and pleasure at the banquet were sons Drs. Robert B. and Norman A. Watson, the latter a UCLA professor of physics (emeritus).

Robert is chief of the Physics, Electronics and Mechanics Branch, U.S. Army Research Office, Office of the Chief of Research and Development, HQ Department of the Army. Known as one of the Army's top electronics experts, particularly on lasers, masers and irasers, he has served on numerous U.S. Government advisory groups and on several NATO panels or working groups. As part of his training, he received his master's degree at UCLA.

Congratulatory greetings from President Richard Nixon, California Governor Ronald Reagan, University of California President Charles Hitch, UCLA Chancellor Charles E. Young, and numerous dignitaries from all parts of the world gladdened Dr. Watson on his 100th birthday. He graduated from Los Angeles State Normal School, predecessor to the UCLA.

Among famed buildings on which he was an acoustical consultant are the Pentagon in Washington and Beckman Auditorium at the California Institute of Technology, the latter when he was past 90. He is confounder of the 4,000-member Acoustical Society of America.

UCLA past Chancellor Vern O. Knudsen and University of Illinois President John E. Corbally Jr. were among those who sent congratulations at his "centennial celebration." He served with distinction as a professor at the University of Illinois for more than 40 years, and as editor and then president of the Acoustical Society.

Even at 100, Dr. Watson has "something in mind" for the future, he told guests at the banquet. The goal is to produce the perfect acoustical room—one in which everyone can hear what's going on. He walks and reads daily but is now hard of hearing.

Factors in his long life? Well, he has been a lifelong abstainer from alcohol and tobacco, and "the most lost part of every day is when you are not having a laugh"—trying to make others happy.

"BE SEATED, YOUNG MAN" appears to reflect the gesture of Dr. Robert B. Watson as he and brother Norman (center) help celebrate the 100th birthday of their father Prof. Rowe Watson.

Retiring 'Charter Member' Recalls WSMR History

Until his recent retirement, Charles A. Brink was a "charter member" of the White Sands (N. Mex.) Missile Range (WSMR) work force—the only employe who had worked continuously at the range since its establishment in 1945.

A civil engineer with the Plans and Engineering Office, National Range Operations when he retired, Brink worked initially with a Corps of Engineers crew which came in mid-1945 to survey the Tularosa Basin desert site for the first all-land missile range.

Arriving from Fort Wingate, near Gallup, N. Mex., on temporary orders, he managed to get them renewed several times until he was transferred to the Ordnance Corps. During 26 years, he watched the original tent city at White Sands grow into a billion-dollar activity boasting the most sophisticated instrumentation of any missile range in the Western World. He entered Federal Civil Service in 1942 as a Corps of Engineers employe at Army Air Base, Hobbs, N. Mex.

During the early days, he was assigned to the Technical Operations Office to assist in missile recovery work. From vantage points as spotting stations on Tula Peak and San Andres Peak, his job was to report location of impacting missiles to recovery teams, using a 360-degree azimuth rangefinder.

While reminiscing recently, he recalled the many days he spent at the 8,000-foot altitude of San Andres Peak in a nearly frozen condition, but he saw most of the V-2 and Tiny Tim rocket firings.

One of Brink's first jobs was to establish sectional land markers, spaced a mile apart, before the geodetic surveys were made. Needing something that was easy to spot, he found and used surplus target rockets having wooden fins, ideal for quick identification. Some of the fins can still be seen along the Las Cruces access road.

Today Brink is settled in Las Cruces, N. Mex., enjoying the "Land of Enchantment."

Charles A. Brink

Natick Labs Master Baker Sets Highest Skill Score

A master baker at the U.S. Army Natick (Mass.) Laboratories, Staff Sergeant Richard E. Morgan, was commended recently for achieving the highest Army-wide score in his primary occupational specialty.

As part of the Army's skill evaluation program for enlisted personnel, the commendation gives Sergeant Morgan an edge over other bakers, including his mother. She was the first to spark his interest in kitchen activities years ago.

"But, you can't beat Ma's cooking," said the 27-year-old soldier, "it has that extra bit of love in it."

At Natick he is a member of the Food Service Equipment and Evaluation Team which tests field and garrison food preparation systems. The team is currently engaged in work on a continuous bread-baking process.

To further his military career in food service supervision, Sergeant Morgan, a Vietnam veteran with nine years of Army service, takes extension courses from the Fort Lee (Va.) Food Service School and is planning to attend college-level courses in the future.

Career Programs . . .

Army Reacts to Changing Attitudes of Younger Officers

U.S. Army reaction to changing attitudes and goals among younger officers is reflected in a new concept for career development involving three 10-year phases. Known as the Officer Personnel Management System (OPMS), it provides equal opportunity for more control over individual goals. Stated objectives are:

- Increase professional competence of the officer corps through greater regard for concentrated assignment patterns.
- Provide career satisfaction by allowing an officer more voice in career development to do the jobs he does best.
- Decrease "ticket punching" by providing multiple pathways to success.

Directed toward procedures that will best utilize technical skills and aptitudes, the system is applicable to all except officers in the Army Medical Department, Chaplains Corps, and in the Judge Advocate General Corps.

Dual Track Development. Officers will acquire and maintain proficiency in a primary and secondary skill area during the 10-year field grade development phase. In most cases an officer's primary skill will continue to be his branch qualification. His secondary skill may be in either a staff functional area in one of the 10 special career programs.

For example, an Infantryman could choose a secondary skill in one of the functional fields such as Personnel, Military History, Operations or Logistics; or he might prefer to go into Research and Development, Comptroller, Atomic Energy, Automatic Data Processing or one of the other special career programs.

Officers must identify their secondary skill area prior to promotion to major and must be proficient in this area prior to promotion to lieutenant colonel.

Proficiency requires two successful assignments in that field or one assignment plus an advanced degree in a related discipline.

The dual track development concept of OPMS is compatible with the rationale of the R&D Career Officer Program—*maintenance of traditional branch proficiency through a career pattern of alternating command and staff experience with assignments in the R&D field.*

The "ideal" research and development officer takes valuable "user

Presidential S&E Internship Program Provides MERDC With Young Engineers

Under the Presidential Internship Program in Science and Engineering announced last fall, the U.S. Army Engineer Mobility Equipment Research and Development Center, Fort Belvoir, Va., recently employed two engineers.

The program is designed especially to attract unemployed younger scientists and engineers holding advanced degrees, and to match them to tasks where high degrees of specialization may yield innovative ideas in meeting pressing national problems.

The Department of Labor, through its Technology Mobilization and Reemployment Program, is financing the $3 million effort. The one-year internships opened more than 400 training opportunities in federally financed laboratories across the country. Veterans and those from high unemployment areas were given preference.

Federal laboratories in the program were allotted $7,000 for each intern, and matched that amount with either cash or research support.

The Army Engineer Mobility Equipment R&D Center's trainees are Razi A. Kokan, an electrical engineer assigned to the Power Applications and Programs Office of the Electrotechnology Department, and Dr. John George Vlahakis, a chemical engineer working in the Sanitary Sciences Division on the Army's reverse-osmosis water purification process and pollution abatement.

Kokan is a native of India and has nearly 10 years experience in private industry in the utilization of computers and control equipment in the electrical engineering field. He will be concerned with power application problems of systems involving equipment and generator sets, and also a program of in-house investigation into automation.

He has a BS degree in electrical engineering from the University of Madras, India, and a master's from Northeastern University, Boston, Mass. He also attended the Technical Training College at Talhalli, India.

A member of the Institute of Electrical and Electronics Engineers (IEEE), and the Automatic Control and Computer Society, he worked in industry until hit by the current job squeeze. He learned about the Presidential Internship Program through the Fort Belvoir Civilian Personnel Office.

Dr. Vlahakis, a native of Lynn, Mass., earned BS and MS degrees from Tufts University in 1966 and 1968, and his doctorate from Syracuse University this year. He is a member of the American Institute of Chemical Engineers, and learned about the internship program while at Syracuse.

FIRST ENGINEERS to join the U.S. Army Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va., under the Presidential Internship Program in Science and Engineering, include Razi A. Koken, shown above (right) with his immediate supervisor T. David Cooper, chief of the Power Applications and Programs Office of the Electrotechnology Department; and Dr. John George Vlahakis, below (right) with his supervisor Maurice Pressman, Sanitary Sciences Division.

experience" into the R&D process. This is a result of maintaining his basic branch as his primary skill while broadening himself in the secondary skill area of R&D. The program is designed to complement, not replace, an officer's basic branch.

Command Designation Boards. Department of the Army boards will be convened annually to designate command positions for officers selected for promotion to colonel and lieutenant colonel. Officers designated for functional or special career development will concentrate on broadening their experience in a previously chosen functional or special career area.

Officers will be individually advised of their command status and major commanders will be informed of those available for assignment. Officers will remain in command for 18 to 24 months unless promoted or relieved for cause.

In view of the decreasing number of battalion command positions and the stablization of command assignments, all qualified officers will not be afforded the opportunity to command at battalion and higher levels. R&D Career Officer Program members, however, are expected to fare well when considered by the new command designation boards.

Supporting this belief is the recognition that a key ingredient in the R&D formula is "user experience" provided by commanders who have personal knowledge of field requirements and problem areas. Only the best qualified officers are selected for membership in the R&D Career Officer Program. Since demonstrated manner of performance will be a major consideration of command designation boards, program members who have maintained their branch proficiency while developing a secondary skill in R&D will be prime candidates for command designation.

As a further indication of R&D Career Officer command designation potential, an average of two officers per month from the Office of the Chief of Research and Development are selected for battalion command assignments.

Promotion System. The current system will be revised to include expanded Command Designation Board membership. Modifications in their instructions will contain information on short-fall in certain fields and boards will consider these requirements in determining who is selected for promotion. Instructions will emphasize the whole-man concept, with major emphasis on primary skill performance.

Board members will be selected from related branches according to the number of officers in the promotion zone. For example, 55 percent of the members will be in Combat Arms. The revised promotion system will recognize the need for different career patterns and give visibility to career progression in all career fields.

The practice of selecting only the best qualified officers for membership in the R&D Career Officer Program is expected to continue to result in a very high promotion rate. Statistics from the most recent boards show that 65.7 percent of R&D eligibles were selected for promotion to colonel compared to an Officer Personnel Directorate (OPD) average of 48.2 percent. Two program members were selected from the secondary zone.

The latest statistics show that 85.7 percent of eligible R&D majors were selected for promotion to lieutenant colonel compared to an OPD average of 77.3 percent. Seven R&D members were selected from the secondary zone.

MOS Proponency. Military Occupation Specialty designations that are clearly the responsibility of one branch will be assigned exculsively to that branch. For example, Infantry Branch will be the sole proponent for MOS 1542, Infantry Unit Commander. Some MOS designations will be for joint proponency, such as S2/G2 and S4/G4.

In the latter case, the position could be filled by the branch of the particular unit or the branch concerned with the functional area. As an example, the Infantry Battalion S4 position could be an Infantryman, preferably one who has indicated a desire for logistics as his secondary skill, or an officer from the Logistics services branches (QM, TC, OD).

Certain MOS codes, like 2167, R&D Coordinator, clearly do not fall within the responsibility of a single branch or group of branches and will, therefore, remain branch immaterial. The functional area of R&D, a program leader said, requires representation from all the traditional career branches in order to accomplish the Army's research and development mission.

Growth of R&D Career Officer Program Cited in Briefing for Consultant Board

More than 100 highly qualified officers have been accepted in the Research and Development (R&D) Career Officer Program within the past year, increasing membership to 810 as of a recent listing.

Other facts attesting to the program's growth were presented to the R&D Career Officer Consultant Board, headed by Deputy Chief of R&D MG George Sammet Jr., in a recent "updating" briefing by representatives of the Officer Personnel Directorate, Office of Personnel Operations (OPO), Department of the Army.

A forthcoming revision of AR 614-135 will reflect a new listing of designated R&D positions, as a result of recommended changes received by the Office, Chief of Research and Development (OCRD) from field commanders.

The board was apprised of this new listing totaling 1,172 positions—319 designated as key R&D slots and 853 as developmental or supporting positions, including 25 general officer R&D positions. Listed as program members are 210 colonels, 343 LTCs, 219 majors and 38 captains.

Reference was made to the annual review of military positions requiring graduate-level education. Completed recently by the Army Educational Requirements Board (AERB), this action resulted in the validation of 612 designated R&D positions for advanced degrees.

AERB results have been incorporated into the R&D Career Officer listing for the first time and will be available to program members when the 1972 version of AR 614-135 is published.

Another program "boost" is the approval obtained from the Deputy Chief of Staff for Personnel to select one R&D Career Officer Program member each year to attend a 12-month course at the Royal Military College of Science Guided Weapons Systems, Shrivenham, England, leading to a master's degree. Nomination procedures are in progress for the first available course starting in January 1973.

The Consultant Board was also advised that responsibility for distribution of the R&D Newsmagazine to each program member has been removed from The Adjutant General's Office (TAGO) and assumed by the Secretary of the R&D Career Officer Program Consultant Board. A workable system for maintaining a current address listing of members has been initiated.

Further enhancing the R&D Officer Program, a special OCRD briefing team visited the Engineer, Air Defense Artillery, Ordnance, and Signal Schools this year. The team has publicized the program with presentations on R&D management, hardware developments, and new initiatives.

Headed by a general officer from OCRD, the briefing team is scheduled to visit the Field Artillery School at Fort Sill, Okla., in July and the remaining service schools later in the year.

ADP Career Officer Applicants Increasing

A growing number of Army officers are applying for admission to the Automatic Data Processing (ADP) Career Program.

Although the growth is due in part to a stronger emphasis on recruitment, it primarily reflects the realization by many officers that automation and information systems are increasingly important in the Army's day-to-day activities.

The number of ADP positions throughout the Department of Defense (DoD) and the Department of the Army (DA) has steadily increased, with new positions continuously being validated.

The goal of the ADP Career Program is to identify and develop officers for these positions.

To qualify for the program, an officer must: be in the grade of captain through colonel; be a member of a branch other than Medical, JAG, or Chaplain; have completed the appropriate level military course (Command and General Staff College for field grade); and have a BA degree or higher in an ADP-related discipline. Other prerequisites are listed in AR 614-138.

Additional information on the ADP Career Program may be obtained by writing: HQDA (DACS-CMM/LTC Scholtes), Pentagon, Washington, D.C. 20310.

CAD-E Training Program Leads to Master's Degree . . .

One-Year Course Sponsored by AMC at Michigan University

Computer-Aided Design and Engineering (CAD-E) training, leading to a master's degree from the University of Michigan, was started recently by 17 civilian employes selected competitively throughout the U.S. Army Materiel Command (AMC).

In a related training effort, four one-week executive-level seminars have been scheduled at the U.S. Military Academy, West Point, N.Y. The first CAD-E seminar will begin July 31 for a class limited to 20. It will serve to review the progress since the *Army R&D Newsmagazine* publicized CAD-E program objectives in a page 1 article in January 1970.

The USMA seminars will orient top-level managers and scientific personnel in the exploitation of CAD-E techniques to reduce cost, shorten lead time from the inception of a new concept to production of a usable item, and improve the quality of materiel. Guest speakers prominent in CAD-E progress will be featured and nearby AMC activities will be visited for CAD-E demonstrations. Students will receive maximum hands-on computer instruction.

BG Mahlon E. Gates, AMC Deputy Director of the Research, Development and Engineering Directorate, and chairman of the AMC CAD-E Council, is devoting priority effort to development of the CAD-E capability within the AMC.

The CAD-E one-year course at the University of Michigan is being sponsored by AMC to develop a nucleus of expertise. It includes development and application of computer equipment, programs, and theory toward facilitating engineering design.

In all, about 100 individuals from AMC arsenals, laboratories, and research and development centers will receive this in-depth training during the next several years.

Nominees must have at least three years intensive design and/or engineering experience; they must hold a baccalaureate degree in an engineering or science discipline; have an undergraduate average of "B" or above, unless other significant qualifications exist; and they must have Federal Civil Service career status.

Selectees attending the initial class are:

MELVIN L. GOSS and LLOYD E. KRIVANEK from the *U.S. Army Mobility Equipment Command (MECOM),* Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va.

Goss joined the MERDC professional staff in 1951 and is presently employed as an engineer in the Electrical Equipment Division, Electrotechnology Department. He received a BS degree in electrical engineering from Purdue University in 1950, and earned a master's degree from George Washington University in 1965.

Krivanek has been with the R&D Center since 1968 and is now with the Marine and Bridge Division, Military Technology Department. He received a BS degree in civil engineering from the University of Nebraska in 1962.

Lewis S. Epstein, an aerospace engineer, was selected from the *U.S. Army Aviation Systems Command, (AVSCOM),* St. Louis, Mo. Assigned to the Preliminary Design Group, his major effort is directed to development of computer programs that will aid in design of rotary-wing aircraft.

Lewis S. Epstein

He holds a BS degree in aeronautical engineering from the Polytechnic Institute of Brooklyn in 1968, and earned an MS degree in applied mechanics from Washington University (1971) in 2½ years, after duty hours.

ARTHUR W. LINDBERG, JOHN MEDEA, JOHN S. DEHNE, and DENNIS E. GUNDERSON were selected from the *U.S. Army Electronics Command (ECOM),* Fort Monmouth, N.J.

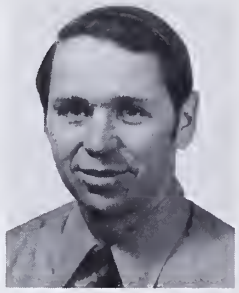
Lindberg is working on development and testing of avionics equipment and systems, specifically Standard Lightweight Avionics Equipment (SLAE), at the Avionics Laboratory, Airborne Systems Technical Area, Fort Monmouth, N.J. He earned a BS degree in electrical engineering from Drexel Institute of Technology in 1968.

Medea is a physicist assigned to a research team with prime responsibility for monitoring task-type contracts dealing with the investigation of techniques applicable to the general countermeasures field. His work includes computer simulation of over-all systems parameters in such areas as communications, jamming, antijamming, coding, fuzes, expendable devices, and other sensitive hardware. Medea earned his BS degree in physics from Villanova in 1969, and has done postgraduate work at the Polytechnic Institute of Brooklyn.

Dehne's formal education includes a BS degree in physics from the Massachusetts Institute of Technology (1968) and an MS degree in physics from Fairleigh Dickinson University (1971). Employed in the CS&TA Laboratory, he performs engineering investigations and studies related to the development of equipment for artillery flash detection from an airborne platform.

Gunderson is leader of an engineering design team at the ECOM Night Vision Laboratory, Fort Belvoir, Va., responsible for design and development of night vision systems for use by land combat troops. Gunderson graduated from the University of Wisconsin in 1958 with a BS degree in mechanical engineering, and holds a master of automotive engineering degree granted by the Chrysler Institute of Engineering in 1960.

Donald W. Holder will attend the university as a representative of the *U.S. Army Missile Command (MICOM),* Redstone Arsenal, Ala. He is involved with investigations of advanced missile systems, particularly those employing advanced navigation and guidance techniques, within the Aeroballistics Directorate, Directorate for Research, Development, Engineering and Missile Systems Laboratory. Holder earned a BS degree in mathematics from Jacksonville (Ala.) State University in 1960.



Donald W. Holder

Melvin L. Goss

Lloyd E. Krivanek

Arthur W. Lindberg

John Medea

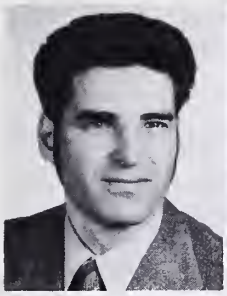
John S. Dehne

Dennis E. Gunderson

ROBERT H. HAVESON and RICHARD M. TRAMO were nominated by the *U.S. Army Munitions Command (MUCOM),* Picatinny Arsenal, Dover, N.J.

Haveson, an electronic engineer, is engaged in characterizing an electro-magnetic

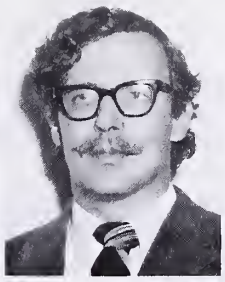
career programs



Robert H. Haveson

Richard M. Tramo

Keith Witwer

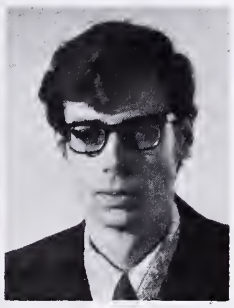


William V. Cassell

generator, LC oscillator, and associated digital counting circuits on the computer for efficient optimization. Haveson holds a patent on the Batteryless Beehive Fuze. Using FORTRAN (a scientific programing language for computers), he wrote the first complete oscillator computer program (CHAOS) at Picatinny Arsenal. He earned his BS degree in electrical engineering from Fairleigh Dickinson University (1964).

Tramo is engaged in concept evaluation, including theoretical description and application of concept to fuzing and timing devices at Frankford Arsenal, Philadelphia, Pa. His academic qualifications include a BS degree in physics from St. Joseph's (Philadelphia, Pa.) College (1968) and graduate work toward an MS degree at Drexel University.

Francis B. Hoogterp



Joseph M. Wollam

FRANCIS B. HOOGTERP and JOSEPH M. WOLLAM were selected from the Research, Development and Engineering Directorate, *U.S. Army Tank-Automotive Command (TACOM),* Warren, Mich.

Hoogterp is assigned as a mathematician in the System's Simulation Office where he is involved in the development and modification of mathematical models for vehicle simulation on digital/analog computers. He has a BS degree in mathematics from Aquinas (Grand Rapids, Mich.) College (1965), and an MS degree in mathematics from Wayne State University (1967).

Wollam is currently in two major engineering projects at TACOM. The first is related to CAD-E under the discipline of automatic data reduction; the second is an in-house research program with the objective of determining the effect of involuntary gunner motion resulting from vehicle motion on the over-all effectiveness of a stabilized main weapon.

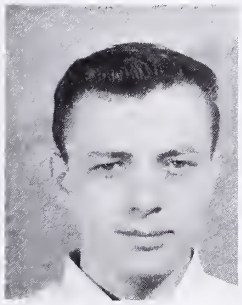
Wollam has BS degrees in physics (1964) and in mechanical engineering (1966), both from Michigan State University.

KEITH WITWER and WILLIAM V. CASSELL were selected for their accomplishments and future potential at the *U.S. Army Weapons Command (WECOM),* Rock Island, Ill.

Witwer is a team leader for in-house design activities within the Squad Automatic Weapon (SAW) development program. He holds a BS degree in mechanical engineering (1966) and an MBA degree in production (1968), both from Michigan State University.

Cassell performs independent research on metals and their fabrication techniques at the Weapons Laboratory. At the present time, he is project engineer on programs in powder metallurgy, isothermal forging, and surface diffusion treatments. He earned a BS degree in metallurgy from Youngstown University in 1962 and an MS degree in metallurgical engineering and materials science from the University of Notre Dame in 1968.

Colin E. Freese is a mechanical engineer nominated by the Mechanics Research Laboratory, *U.S. Army Materials and Mechanics Research Center (AMMRC),* Watertown, Mass.



Colin E. Freese

Freese earned a BS degree in civil engineering from the University of Illinois (1966). Employed in development of analytical solutions in solid mechanics for design principles and data, he is assigned to a team responsible for solution of analytical fracture mechanics problems. This involves the application of elasticity theory to the determination of stress and strain states in the vicinity of cracks and notches in advanced materials.

Marc A. Ressler obtained a BS degree in electrical engineering from the University of Maryland in 1969 and is now employed by the *Harry Diamond Laboratories (HDL)* in Washington, D.C.

Marc A. Ressler

With another engineer he is developing a radar signal processor capable of identifying different types of targets, by using digital systems and CAD-E concepts.

Earl P. Weaver provides mathematical support of scientific research projects. His work requires innovative ideas, development of analytical or computational methods, and the machine solution problems at the Ballistics Research Laboratories, *U.S. Army Aberdeen Research and Development Center (AARDC),* Md. Weaver has a BS degree in mathematics from the University of Delaware (1967).

Earl P. Weaver

AVSCOM Shares 1972 Award For Professional Development

The Army Aviation Systems Command (AVSCOM), headquartered at St. Louis, Mo., is a cowinner of the 1972 Government Professional Development Award given by the Missouri Society of Professional Engineers.

The honor is shared with the U.S. Department of Health, Education and Welfare's Regional Office Facilities Engineering and Construction Agency, Kansas City.

COL John C. Geary, AVSCOM's director for Research, Development and Engineering, accepted the award. One of the cowinners will be selected in August as the state society's entry in a national competition, the winners of which will be announced in January 1973 by the National Society of Professional Engineers.

Judging is based on eight areas covering federal government professional engineering employment policies. Included are education, registration, recruiting and indoctrination, salary, participation in professional and technical society activities, professional environment, merit system and position classification, and engineer-management communications.

AVSCOM has responsibility for Army aircraft throughout their life cycle, plus aerial delivery equipment, including basic and applied research. Of its 700 engineers, 545 have bachelor degrees, 88 have master degrees and 17 have doctorates. Another 50 have degrees in related fields and five who do not have degrees are licensed as professional engineers.

Self-Paced Instruction:

APG Implements Non-Conventional Learning System In Program to Save Training Time, Improve Morale

TELLING AND SHOWING. Students in the self-paced instruction phase of the 44C20 welding course use TV monitors for instructions and demonstrations prior to going on to their practical exercises at the U.S. Army Ordnance Center and School (USAOCAS).

DOING. Student in welding course prepares to strike an arc during a practical exercise of the self-paced instruction.

CHECKING. Student has his practical work checked by an instructor during the final phase of self-paced instruction.

"Self-Paced Instruction," tested in an experimental 12-week course, has been instituted at the U.S. Army Ordnance Center and School (USAOC&S), Aberdeen Proving Ground, Md.

A welding course taught by the Metalworking Services Training Department implemented the new instruction under the guidance of Charles E. Swaringen, project officer from the Research and Studies Section, Instructional Methods Division.

SPI enables a student to undergo a complete course of instruction at his own rate of speed. Five U.S. Continental Army Command (CON-ARC) schools are using SPI, which trains the individual as a separate person, and not merely as a member of a class.

In the 54-hour block of Tungsten Inert Gas (TIG) welding instruction, it was found that the average student completed in about 31 hours a normal instructional 54-hour course. Further time saving is anticipated.

In manual skill, or vocational courses, learning can be divided into four steps: telling, showing, doing and checking. For the first two steps of telling and showing, seven TV tapes were produced. Portable TV record and playback tape units were placed in a classroom where the student had ready access when he had need for such aids.

All a student had to do was to go to the room and ask the technician to play any one of the tapes, and sit down before a TV to watch the particular lesson. Four monitors can accommodate one to four students each, allowing 4 to 16 students to receive instruction from any of the seven TV tapes.

This system is being streamlined and video cassette units are on order. With the cassettes, the student will obtain the needed tape from the technician, go to a monitor, insert the cassette, and watch the presentation. If he needs more time on any particular exercise, he is able to program his time to allow successful completion of that phase.

SPI students have been very enthusiastic about it and have maintained equal grades and standards with students utilizing the conventional method. Instructors have found that they have more time to spend with the individual student.

One SPI fringe benefit has been an upswing in student morale, in that they have developed a competitive attitude and almost everyone wants "to beat his buddy"—a goal facilitated by being able to recycle a single lesson or a complete block of instruction without a waiting period.

"Saving training time is our primary goal for self-pacing," Swaringen said. "We believe that certain courses can be self-paced. . . . This will allow students to have more productive time at their next assignment."

It is expected that SPI will lower attrition rates due to failures because students will have more time to work on particularly troublesome areas. The time saved on some lessons will enable them to concentrate on difficult material.

Project Manager Selected For Army Reorganization

The Secretary of the Army and the Army Chief of Staff have announced that MG James G. Kalergis has been named project manager to develop a plan for a major reorganization of Army elements located in the continental United States.

The goal is to streamline the Army command and management structure to meet more effectively the requirements of the 1970s, with an eye toward more economical and effective use of defense dollars.

A series of preliminary staff studies has addressed possible realignments of major commands and higher headquarters staffs.

The studies have also focused on improving the Army's capability to maintain active and reserve forces' readiness, increasing the effectiveness of schools and training, and improving methods of developing equipment and forces.

Drawing from these studies, MG Kalergis will recommend a program of organizational improvement to the Chief of Staff and the Secretary of the Army.

career programs

Women in Army Science . . .

Natick Researcher Named First Participant in New Program

Dr. Gail D. Mulligan

Dr. Gail D. Mulligan, a research chemist at the Army Materials and Mechanics Research Center (AMMRC) in Watertown, Mass., is the first participant in a new program designed to develop in-house laboratory excellence in administration and management.

AMMRC Director Dr. Alvin E. Gorum announced: "During the next six months Dr. Mulligan will receive an intensive indoctrination in how administrative support for government research operates.

"She will be assigned responsible tasks in our Planning Directorate, Comptroller Division, Contract and Procurement Branch, Management Information Systems Branch, Force Development Division, and Civilian Personnel Division. The work will be productive and difficult, and accomplishment will be measured."

Some of the specific areas in which Dr. Mulligan's services will be employed include: participation in Department of Defense fund apportionment meetings; designing of cost-reduction programs; assisting in developing R&D contracts; running test data and programs on the UNIVAC computer; conducting manpower surveys; and reviewing the center's appraisal system for its Engineers and Scientists Career Program.

Dr. Mulligan is among the young military and civilian scientists who have attracted international attention to the AMMRC. A graduate of Regis College with a degree in chemistry, she received her master's degree from Brandeis University and her doctorate in chemistry from Boston College.

Prior to joining the Polymers and Composites Division of AMMRC in 1969, Dr. Mulligan taught chemistry at the high school and college level. Her research experience included the synthesis of anti-metabolites; work on anti-tumor agents; organometallic monomers; the separation and characterization of brain galactolipids; and the synthesis and reactions of sulfonium ylids.

At AMMRC she has served as a research specialist in the Polymers Synthesis Group, conducting broad research programs relating to the study of high-temperature carbocyclic and heterocyclic polymers and condensed aromatic compounds.

In addition to contributions to the technical literature, Dr. Mulligan recently gave a briefing in Washington to the Office of the Chief, Research and Development, Department of the Army on the Army Materiel Command's program in environmental deterioration of material and materiel which earned her a Letter of Commendation from OCRD.

Dr. Gorum said the primary goal of this new Managerial/Administrative Development Program is: "To enable the participants to become familiar with the principles and practices we use in planning and controlling work, seeing the center as a unit, and recognizing the interdependence of resources, functions and personnel."

Retired Army Nurse Appointed Special OTSG Consultant

COL Margaret E. Bailey, USA-Ret., has been appointed to a recently established position as consultant to The Surgeon General for Health Care Opportunities for Minority Groups.

Retired last year following 27 years of military service, COL Bailey lists a number of distinguished "firsts" in her career. In 1962 she became the first black nurse to attain the rank of lieutenant colonel.

With her tour of duty at Chinon, France, in 1966, she became the first black chief nurse and in 1970 became the first woman of her race promoted to colonel.

She earned a degree in nursing from San Francisco State College before beginning her military career in June 1944. Her duty posts included Fort Huachuca, Ariz.; Station Hospital, Florence, Ariz. (POW Camp); U.S. Army Hospital, Camp Beale, Calif.; Halloron General Hospital, Staten Island, N.Y.; Tilton General Hospital, Fort Dix, N.J.; Percy Jones General Hospital, Battle Creek, Mich.; Madigan General Hospital, Tacoma, Wash.; Letterman General Hospital, San Francisco, Calif.; and Fitzsimons General Hospital, Denver, Colo.

COL Bailey also served overseas at the 98th General Hospital in Munich, Germany; 2d General Hospital, Landstuhl, Germany; and the U.S. Army Hospital at Camp Zama, Japan.

Before retiring she was consultant in the Job Corps Health Office at the Department of Labor.

Miss Strasser Selected for Hunter College Hall of Fame

Stella Strasser, an electronics engineer at the U.S. Army Electronics Command, Fort Monmouth, N.J., is among the first alumnae named to the Hunter (N.Y.) College Hall of Fame, inaugurated during the college's centennial celebration.

Miss Strasser is a member of the Signal Recording and Display Team in the Electronic Warfare Laboratory's Supporting Development Technical Area. She was recognized for service to the college and community, as well as for professional achievement.

Graduated from Hunter in 1932 with a BA degree in mathematics, she started her government service career in 1942 and later received a graduate degree in electronic engineering from Rutgers. She also has studied at M.I.T., the University of Michigan, and Polytechnic Institute of Brooklyn.

As an undergraduate, Miss Strasser was elected to Pi Mu Epsilon and Theta Mu Tau, honorary societies in mathematics and physics. She is a member of the Board of Directors of the Tri-State Club of Old Crows, a professional association formed for the interchange of technical information in electronic warfare techniques. In 1966 she was one of the first female recipients of the Old Crows' Certificate of Merit.

Miss Strasser is active in the Fort Monmouth chapter of the Association of Federally Employed Women (FEW), is a member of the Institute of Electrical and Electronic Engineers, and has presented numerous professional papers.

Stella Strasser

Wife of Army Psychiatrist Sworn Into Medical Corps

MAJ Yolanda Norton, a specialist in neonatology, was recently sworn into the Army Medical Corps as the first mother with a dependent child.

Her husband, MAJ Jay Norton, is a forensic psychiatry resident at Letterman General Hospital, San Francisco, Calif., where she will serve as a staff pediatrician.

She is the 25th woman physician to join the 6,000 male members of the Medical Corps. Because of her petite size 5 figure, a special uniform was tailored for her.

She completed medical school at the University of Santo Tomas in the Philippines and interned at the university hospital and Manila General Hospital. To qualify for a U.S. license she served another internship at a Boston hospital.

Personnel Actions . . .

BG McWhorter Assumes Command of Natick Labs

Command of the U.S. Army Natick (Mass.) Laboratories was assumed July 25 by BG John Calvin McWhorter, formerly senior adviser to U.S. Military Assistance Group in Korea. He succeeds COL William B. Levin, who retired from the Army after commanding the NLABS since December 1971.

From September 1970 until August 1971, he commanded the 19th General Support Group and became CG in February 1972 when it was redesignated the Korea Support Command.

After graduating from the Industrial College of the Armed Forces (ICAF) at Fort Leslie J. McNair, Washington, D.C., in June 1968, he served as director of Planning and Management, Defense General Supply Center, Richmond, Va., until reassigned to Korea.

Completing the advanced course at the U.S. Army Command and General Staff College in December 1962 and presented the John C. Marshall Award by then Under Secretary of the Army Stephen Ailes as the outstanding scholar in a class of 444 (including 33 students from 15 countries), he was assigned as a staff officer at the Army Research Office, Office of the Chief of Research and Development, Arlington, Va.

His next assignment (1963–66) was in London as a technical representative of the U.S. Army Quartermaster Corps, followed by duty as a battalion commander at Fort Lee, Va. and in Vietnam before returning to the states to attend the ICAF.

BG McWhorter is a native of Mercedes, Tex., and attended Texas A&M University for a year until he entered the United States Military Academy, West Point, N.Y., and was graduated in 1946. Later he was a student at Lowell (Mass.) Technological Institute under the Army's advanced education program, obtaining a Master's degree in textile engineering in 1949.

BG John C. McWhorter

Kavanaugh Becomes Aberdeen R&D Center Executive

Newly assigned executive officer of the Human Engineering Laboratory (HEL), U.S. Army Aberdeen (Md.) Research and Development Center is LTC Richard D. Kavanaugh.

Graduated in 1954 from the United States Military Academy, West Point, N.Y., he received his master's degree in industrial management in 1963 from the University of Tennessee, Knoxville.

A Senior Army Aviator, he earned his Army wings in 1960 upon graduation from the U.S. Army Aviation School, Fort Rucker, Ala., and was chief, Logistics Division, U.S. Army Aviation Maintenence Center, Mannheim, Germany (1964–66).

Commanding officer of the 79th Transportation Company in the Republic of Vietnam from 1966 to 1967, he next served three years as staff maintenance officer with the John F. Kennedy Center for Military Assistance at Fort Bragg, N.C.

Subsequently he served as a research and development coordinator, Weapons Division, Directorate for Research, Development and Engineering, Army Materiel Command, Washington, D.C. In 1971, he was assigned as R&D coordinator and then chief, Research and Development Divison, Army Concept Team in Vietnam.

LTC Richard D. Kavanaugh

OCRD Officer Assumes Dual Responsibility at AMMRC

Commanding officer and deputy director of the U.S. Army Materials and Mechanics Research Center became the dual responsibility of LTC Robert B. Henry when he recently concluded a 3-year tour of duty with the Office of the Chief of R&D, HQ DA.

His new responsibilities are concerned with basic and applied research on metals, ceramics, organics and composites, and the application of advanced materials concepts to armor, cannon, missiles and launchers, aircraft and other items of ordnance. In OCRD he served in the Nuclear, Chemical and Biological Division, the last year as chief of the CBR team.

Graduated from the U.S. Military Academy (USMA) at West Point, N.Y., in 1955, he received an MS degree in chemistry from Pennsylvania State University in 1962, and has completed special studies at the University of West Virginia and the University of Vienna. He was an instructor and assistant professor, Department of Physics and Chemistry, USMA (1962–65).

Prior to his OCRD assignment, he served a year in Vietnam as chemical operations officer, then as chief of the Chemical Branch, and assistant G-3, U.S. Military Assistance Command.

Several of his technical papers in the field of organic chemistry have been published in professional journals. He is the author of "Molecular Theory as Applied to Fulvene Reactions," which was selected for presentation at the 1972 Army Science Conference at USMA.

LTC Robert E. Henry

Former SASCOM Commander Named TASCOM Deputy to CG

The former commander of the U.S. Army Special Ammunition Support Command (SASCOM), Europe, has moved to HQ TASCOM (Theater Army Support Command) as deputy to the commanding general for Special Munitions and Aircraft.

COL Aaron E. Walker fills the position left vacant in March by the transfer of COL William J. Macpherson, and filled in the interim by COL Francis M. Palmatier.

Graduated with a BS degree in physics and mathematics in 1949 from Oklahoma's East Central State College, COL Walker earned his master's degree in 1963 in economics from the University of Alabama. He is also a graduate of the Army War College.

Walker began his third European tour of duty last July when he assumed command of SASCOM. He served in England, France and Germany during World War II. From 1956 through 1959, he was first at Seventh Army Headquarters in Stuttgart and then with the 3d Armored Division in Hanau.

Among his awards and decorations are three Legions of Merit, the Bronze Star and three Air Medals.

BG Nichols Designated as Topographer of Army

Topographer of the Army BG Wayne S. Nichols has assumed that title along with his responsibilities as Director of Military Engineering in the Office, Chief of Engineers, Department of the Army.

Topographer of the Army duties cut across a broad spectrum of staff activities required for topographic support of the Army in the field. These include research and development of topographic and military geographic intelligence systems and techniques, planning, training and education, force development and organization, materiel and manpower requirements.

BG Nichols will serve as adviser to and representative of the Chief of Engineers in all topographic activities for which the chief is responsible under the guidance and supervision of the Army General Staff.

As Topographer of the Army he succeeds BG Edwin T. O'Donnell, new Missouri River Division Engineer with headquarters at Omaha, Nebr. The Army Topographic Command, which BG O'Donnell commanded in addition to his duties as Topographer of the Army, recently became a part of the Defense Mapping Agency in a consolidation of Department of Defense (DoD) mapping, charting and geodesy activities.

A 1946 graduate of the U.S. Military Academy, BG Nichols has served in various command and staff positions in Europe, the Far East and Korea, and the continental United States, including a tour of duty with HQ, Department of the Army, Washington, D C., and as engineer instructor at the University of Iowa.

He was an Engineer Construction Group commander in Vietnam before assuming duties as director of Construction in the U.S. Army Vietnam Engineer Command. BG Nichols joined OCE as director of Military Engineering in September 1971.

BG Wayne S. Nichols

COL Macpherson Takes Over As School Deputy Commandant

COL William J. Macpherson, until recently deputy to the CG for Special Munitions and Aircraft, HQ U.S. Theater Army Support Command, Europe, is the new deputy commandant of the U.S. Army Ordnance School, Aberdeen Proving Ground, Md.

A 1942 graduate of Clemson University with a BS in mechanical engineering, COL Macpherson has served 29 years active duty, mainly in the nuclear weapons/missile field.

COL Macpherson was CO of an ordnance nuclear weapons battalion from November 1952 to December 1957, first at Sandia Base, N. Mex., and later in Germany, and has also served both as assistant commandant and commandant of the U.S. Army Ordnance Guided Missile School at Redstone Arsenal, Ala.

His military schooling includes the Command and General Staff College and the Army War College nonresident course.

Branch Chief at Frankford Appointed to Key Lab Post

George C. White Jr. has been appointed deputy director of Frankford Arsenal's Pitman-Dunn Laboratory, Philadelphia, Pa.

COL James L. Wallace, CO of the arsenal, announced the appointment following White's progressive assignments as technical assistant to the laboratory director, deputy director of the Physics Research Laboratory, and chief of the Physics and Mathematics Branch.

A graduate of Villanova University with a BS degree, White has done postgraduate work at the University of Pennsylvania, Temple University and Pennsylvania State University.

White is the recipient of five U.S. Army meritorious civilian service commendations.

BG Van Loan Elia Named Army Vet Corps Chief

BG Charles Van Loan Elia, recently promoted to that rank, has been named Chief of the Army Veterinary Corps, succeeding BG Wilson M. Osteen who retired from active duty.

Army Veterinarian at Fifth U.S. Army Headquarters until recently, BG Elia is a graduate of Texas A&M University where he received his doctor of veterinary medicine degree in 1943. Shortly thereafter he began his military career as assistant remount veterinarian, responsible for the medical processing of horses, mules, dogs and pigeons shipped from the West Coast to the China-Burma-India Theater of Operations.

Assigned in 1952 to the Joint U.S. Military Aid Air Group, Greece, he served as veterinary consultant to the Greek National Army. In 1954 he was named chief of the Professional Planning and Programing Branch, Veterinary Division, Office of the Surgeon General, Washington, D.C.

As deputy director and veterinary consultant in the Department of Public Health and Welfare, he served with the U.S. Civil Administration for the Ryukyu Islands until he returned in 1962 to become commandant of the U.S. Army Medical Department Veterinary School in Chicago, Ill.

From 1965 his assignments have included: chief of the Veterinary Division, Womack Army Hospital, Fort Bragg, N.C.; staff veterinarian, HQ U.S. Army, Alaska; and Fifth Army veterinarian.

Chair-Cane Designer Assigned As Medical Research Lab Exec

LTC Dale E. Stein, new executive officer of the Medical Research Laboratory, Edgewood Arsenal, Md., reported for duty following three years at the Medical Field Service School, Fort Sam Houston, Tex., where his military career began in 1951.

LTC Stein returned to Fort Sam Houston in 1967 for duty at Brooke Medical Center where he served his hospital administration residency.

During that residency he designed a lightweight, 4-legged chair that folds up and doubles as a cane, permitting patients during exercise to relax whenever they feel overtaxed.

Patented and available for sale, the chair was shown in 1971 at the Ohio State Fair, where a 300-pound man tested it in the center of the crowded midway before buying it.

LTC Dale E. Stein

DCSLOG Branch Chief Becomes District Engineer

COL Walter H. Johnson, a branch chief in the Construction Division of the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), Department of the Army, became district engineer at Rock Island, Ill., in June.

COL Johnson has served as a staff officer, II Field Force, Vietnam; commander, 83d Engineer Battalion (Construction), U.S. Army, Europe; assistant professor, U.S. Military Academy; commander, 161st Engineer Company (Missile Command), Korea; assistant to the division engineer, New England Division of the Corps of Engineers; and executive officer, New England Division.

Commissioned in the Corps of Engineers upon graduation from the U.S. Military Academy in 1951, he is also a graduate of the Engineer School, Command and General Staff College, and the Army War College. A registered professional engineer in the State of New York, he holds an MS degree in civil engineering from Texas A&M College.

MG Sweeney Takes Over at White Sands Range

More than 25 years of administering U.S. Army weapons systems and related ordnance programs are part of the professional qualifications of the new commander of the United States' largest all-land missile range.

MG Arthur H. Sweeney Jr., 51, who began his military career in 1942 in powder and explosives at Picatinny Arsenal, Dover, N.J., is now the 11th commander of White Sands (N.Mex.) Missile Range. He succeeds MG E. H. deSaussure Jr., CG since Apr. 8, 1970, who retired after nearly 31 years active duty.

Since entering Massachusetts Institute of Technology, where he majored in chemical engineering and received an ROTC commission to begin 29 years of active duty, General Sweeney has attended numerous civilian and military schools.

He received a master of business administration degree from Harvard University and is a graduate of the Strategic Intelligence School, the Industrial College of the Armed Forces, the Command and General Staff College, and various ordnance and language schools.

In 1963 he was designated as military member of the U.S. Arms Control and Disarmament Agency. There his work included the first U.S. inspection of international bases in the Antarctic and research for inspection methods applicable to International Arms Control agreements.

Until recently he was CG of the U.S. Army's Support Command at Da Nang, Republic of Vietnam, for 19 months.

A native of Charleston, W. Va., he began his military career as assistant chief of the Explosive Department at Picatinny (N.J.) Arsenal. Reverting to inactive status in the Army Reserve after World War II, he was commissioned in the Regular Army in 1947 and, after several interim assignments, served 2½ years in the Management Office of the Office, Chief of Ordnance. In July 1956, he became assistant director, Industrial Operations at the Ballistics Missile Agency, Huntsville, Ala. There he helped plan production of the Redstone and Jupiter missile systems.

He has commanded the 701st Ordnance Battalion, 1st Infantry Division; the Springfield (Mass.) Armory, the Watervliet (N.Y.) Arsenal, and served as deputy CG of the U.S. Army Weapons Command, Rock Island, Ill.

MG Arthur H. Sweeney Jr.

personnel actions

Army Toxicology Leader Ends 33-Year Career

Dr. Seymour D. Silver, director of Edgewood Arsenal's research laboratories for more than 16 years and an international authority on toxicology, has retired after more than 33 years of Federal Civil Service.

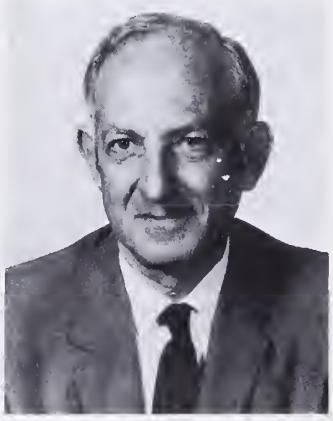
Appointed to the arsenal's chemical staff as toxicologist in 1938, he served his entire career in Army research and development. He was director of the Chemical Laboratory when he retired June 9.

Dr. Silver represented Edgewood Arsenal on numerous national and international boards and committees as a consultant on air pollution and toxicology. For nine years he has been the Army member of the Division of Chemistry and Chemical Toxicology of the National Research Council.

He is also the U.S. national leader of the working panel on chemical systems of the Technical Cooperation Program comprising representatives of the Quadripartite Nations, which include the United States, Canada, Australia and the United Kingdom.

Currently, he is serving a 3-year term on Maryland Governor Marvin Mandel's Science Advisory Council, and was on the Governor's Science Resources Advisory Board (1963-70).

In 1950 he was appointed by President Truman to serve as a member of the United States interdepartmental committee on atmospheric pollution, doubling as chairman of the Panel of Analytic Methods at the First United States Conference on Air Pollution.



Dr. Seymour D. Silver

MG Antonelli Assumes Deputy CG Position

Deputy CG for Logistics Support of the U.S. Army Materiel Command is the new title of MG Theodore Antonelli, who recently returned from completion of a tour of duty as deputy chief of staff, Logistics, U.S. Army Vietnam.

As successor to MG James G. Kalergis, who was recently assigned to the Office of the Army Chief of Staff to develop a plan for a major reorganization of Army elements stationed in the Continental United States, MG Antonelli now commands Army depots in the U.S. in addition to his function of AMC support to the Army in the field.

Assigned to HQ, AMC, 1969-71, he earlier served as AMC's special assistant for Post Hostilities Logistics Operations and director of Distribution and Transportation.

A World War II combat veteran, he received the Silver Star with Oak Leaf Cluster

MG Theodore Antonelli

and a Purple Heart while serving as an Infantry officer in North Africa and in the landings at Salerno and Anzio.

Upon his return in 1960 from duty in Korea as CO of the 23d Transportation Battalion, 1st Cavalry Division, he became chief, Transportation Office, U.S. Army Missile Command, Huntsville, Ala., followed by a 3-year tour with the Joint Chiefs of Staff.

Prior to assignment with AMC in 1969, General Antonelli was vice director of the Defense Communications Planning Group, Washington, D.C.

A 1941 graduate of the University of Connecticut, he received his master's degree in international affairs from George Washington University in 1965. He is also a graduate of the Army War College and the Industrial College of the Armed Forces.

Ward Assumes New USACSC Duties As Deputy for Tactical Systems

COL Robert M. Ward, Army Computer Systems Command (USACSC) Support Group commander at Fort Eustis, Va., since July 1969, recently assumed duties with the Army Computer Systems Command as deputy for Tactical Systems.

COL Ward was first stationed at Fort Belvoir, Va., with the U.S. Army Combat Developments Command in January 1968 upon his return from duty with the 25th Infantry Division in Vietnam.

Serving as the principal adviser and deputy to the USACSC commanding general on all matters relating to tactical automatic data processing systems, he is also the point of contact for all USACSC support to project managers of tactical data systems.

He is a graduate of the U.S. Military Academy, Command and General Staff College, Armed Forces Staff College and the Industrial College of the Armed Forces.

Recent OCRD Assignments List 13 Officers, 3 Civilians

Thirteen officers and three professional civilian employes have recently reported for duty with the Office of the Chief of Research and Development (OCRD), Department of the Army.

COL Richard H. Sawyer has been designated chief of the International Division. Until he completed his tour of duty he was director of Research, Development and Engineering at the U.S. Army Tank-Automotive Command, Warren, Mich.

He holds a BME degree from the College of the City of New York (1950) and MME from Purdue (1955), both in mechanical engineering. His military schooling includes the Command and General Staff College and the Industrial College of the Armed Forces.

In 1968-69 he was project manager for the Mechanized Infantry Combat Vehicle. COL Sawyer was commanding officer of the 4th Maintenance Battalion in Korea (1967-68), following duty as chief of the Program, Plans, and Operations Division, Office of the U.S. Program Manager, Main Battle Tank Development Program.

His decorations and awards include the Legion of Merit with one Oak Leaf Cluster, Bronze Star Medal, Army Commendation Medal with two Oak Leaf Clusters, and Purple Heart.

LTC Eugene J. Vitetta has been assigned as chief of Administration, succeeding COL Clinton B. Haden. Coming to OCRD from the Industrial College of the Armed Forces, LTC Vitetta had served in the International Office.

In Vietnam he commanded the 86th Signal Battalion and was assistant signal officer, Headquarters II FFORV. During 1966-68, LTC Vitetta was deputy director of the Army Armaments Division, U.S. Mission, NATO, in Paris, France and Brussels, Belgium.

Graduated in 1952 with a BS degree in electrical engineering from Norwich University, he attended the Command and General Staff College, British Staff College in Camberley, England, and the Industrial College of the Armed Forces.

LTC Vitetta holds the Legion of Merit, Bronze Star Medal with two Oak Leaf Clusters, Meritorious Service Medal, Air Medal, Joint Services Commendation Medal, Army Commendation Medal with one Oak Leaf Cluster, Army of Occupation Medal, National Defense Service Medal, Vietnamese Campaign Medal, Vietnamese Honor Medal 1st Class, and Vietnamese Service Medal.

Costas J. Labovites, new technical director and deputy of the Army Research and Development Information Systems Office (ARDISO), reported for duty June 12. He succeeds Morton H. Marks, who departed in mid-January to become director of the U.S. Army Management Systems Support Agency.

More than 16½ years of continuous experience in mathematical modeling, computer systems design, and management information systems analysis, beginning soon after he graduated from Clark University with an AB degree in mathematics, are part of his professional background. He has completed graduate school courses at the American University, Washington, D.C.

Prior to reporting to his present assignment, he was director, Scientific Systems Evaluation Directorate, U.S. Army Computer Systems Support and Evaluation Command (USACSSEC), Department of the Army. His responsibilities included the development, evaluation and selection of automatic data processing systems for U.S. Army use worldwide.

Also while at USACSSEC, he served as technical adviser to the chief of the Scientific and Engineering Evaluation Division. His career record reflects experience in key assignments with the former U.S. Army Information and Data Systems Command, the Army Strategic Communications Command, Bureau of Naval Weapons and the Air Force Computation Division in the Pentagon.

Among his professional affiliations are membership in the Mathematical Association of America, Inc., and the Association for Computing Machinery.

LTC Edward J. Bunn is a new staff officer with the Trend Analysis/NTA Team, Plans Division, Directorate of Plans and Programs, OCRD.

He recently returned from Vietnam where he served as chief of the G-3 Plans Division, XXIV Corps. In a previous Vietnam assignment, LTC Bunn was Battalion S-3, 1/7 Artillery, 1st Infantry Division.

LTC Bunn was assigned to Defense Analysis on the Joint Strategic Target Planning Staff in Omaha, Nebr. before attending the University of Texas at El Paso where he earned an MS degree in mechanical engineering. He holds a BS degree in geology from Texas A&M University, and is a graduate of the Armed Forces Staff College.

His decorations and awards include the Legion of Merit, Bronze Star with two Oak Leaf Clusters, Air Medal, Army Commendation Medal with one Oak Leaf Cluster with V and the Joint Services Commendation Medal with one Oak Leaf Cluster.

LTC Joseph Ganahl has joined the Systems Coordinating Team, Plans Division, Directorate of Plans and Programs. In Vietnam until recently, he commanded the 2d Battalion, 34th Artillery.

A 1954 graduate of the U.S. Military Academy (USMA), he has an MS degree in mathematics from Rensselaer Polytechnic Institute.

LTC Ganahl has served as instructor and assistant professor of mathematics at the USMA; chief of the Computer Analysis Branch, Combat Developments Command with station at Fort Bliss, Tex.; and battalion commander in the 3d Battalion, 26th Artillery at Fort Sill, Okla.

Among his military honors are the Legion of Merit with one Oak Leaf Cluster, Bronze Star Medal, Meritorious Service Medal, Air Medal and Army Commendation Medal.

LTC Theodore O. Gregory is newly assigned to the Combat Materiel Division, following a tour of duty in Vietnam as military adviser to the Minister of War Veterans. A 1952 USMA graduate, he earned an MS degree in mechanical engineering from the University of Southern California in 1963.

In recent years he has served as G-3, 1st Armored Division, Fort Hood, Tex.; battalion commander, 3d Battalion, 19th Artillery, 1st Armored Division, Fort Hood, Tex.; operations and training officer, J-3 Division, United

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56 ECOM Engineers, Scientists Earn Master's Degrees

Fifty-six engineers and scientists representing various activities of the U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J., were recently awarded master's degrees by Fairleigh Dickinson University.

The degrees, in electrical engineering, mechanical engineering or physics, are the result of a cooperative graduate extension program begun on-post in 1968 between Fort Monmouth's Personnel, Training and Force Development Directorate and Fairleigh Dickinson's College of Science and Engineering.

The university's graduate extension program at ECOM's Education Center provides, on a continuing basis, all courses leading to master's degrees in business administration, electrical engineering and management sciences. They involve an annual enrollment of approximately 1,000 students.

USALMC Lists 129 Courses Scheduled for Fiscal Year 73

The U.S. Army Logistics Center, Fort Lee, Va., lists in its FY 73 catalog 129 courses, seminars, and programs in logistics, management, research and development, procurement and other fields being offered to military and civilian personnel.

A detailed listing of course numbers, length, opening and closing dates, and due dates for nominations is included. Among them are such specialized courses as: Automatic Data Processing for Logistics Executives, Army Installation Management, Army Management Information Systems, Research and Development Management, and Defense Logistics Instructor Development.

Eligibility by military rank and GS-grade level is specified for each course in "USALMC Course Catalog, FY 73."

HumRRO Research Examines Armed Forces Drug Abuse

Research performed by the Human Resources Research Organization (HumRRO) to determine the incidence of drug abuse in the Armed Forces and to identify demographic correlates of nontherapeutic drug use is described in recent Technical Reports 72-8 and 72-9.

Covering a 2-phrase research project, sponsored by the Advanced Research Projects Agency, the reports include a worldwide survey of the incidence of drug use in the Army, Navy, Marine Corps and Air Force. They also compile the personal interviews with 230 servicemen in the United States on drug-related topics.

Copies are available from: HumRRO, 300 North Washington St., Alexandria, Va. 22314.

OCRD Assignments List 13 Officers, 3 Civilians

(Continued from page 45)

Nations Command, Korea; instructor, U.S. Naval Academy, Annapolis, Md.

A graduate of the Command and General Staff College, he holds the Bronze Star, Meritorious Service Medal, Parachutist Badge, and Korean Parachutist Badge.

LTC Ronald E. Philipp is a staff officer in the Weapons Branch, Combat Materiel Division, after serving in Vietnam as commander of the 215th Composite Support Battalion, 3d Brigade, 1st Cavalry Division.

He has a BS degree from Lafayette College in 1954, MS degree from Lehigh University in 1956, and a 1964 PhD from Columbia University, each in mechanical engineering.

His assignments have included commander, 27th Maintenance Battalion, 1st Cavalry Division; commander, 123d Maintenance Battalion, 1st Armored Division; deputy branch chief, General Purpose Forces Branch, Field Operations Office, Arms Control and Disarmament Agency; sensors officer, Exercise FIRST LOOK, Arms Control and Disarmament Agency.

Among his decorations and awards are Legion of Merit, Bronze Star Medal with OLC, Meritorious Service Medal with OLC, Air Medal, and Army Commendation Medal with two OLCs.

LTC Ivar W. Rundgren is a staff officer in the Air Movement Branch, Air Mobility Division. He recently returned from Vietnam as commander of the 58th Transportation Battalion.

From 1967 to 1970 he was a test pilot with the U.S. Naval Air Test Center, Patuxent River Naval Air Station, Md., and later at the U.S. Army Aviation Systems Test Activities, Edwards AFB, Calif.

Following an assignment as aeronautical engineer with the Aviation Test Board, Fort Rucker, Ala., he commanded the 398th Transportation Detachment, stationed in Saigon (1965–66). He was awarded the Bronze Star Medal in March 1967.

LTC Garrett V. Sidler is a staff officer in the Combat Support Branch, Combat Materiel Division, fresh from duty at Fort Benning, Ga., as executive officer, 931st Engineer Group, following service as commander of the 818th Engineer Battalion.

In Vietnam, 1968–69, he was deputy province adviser, Chuong Thien Province Advisory Team. Previously, he was chief of the Operations Branch, Engineer Division, CENTAG (Central Army Group), a NATO headquarters in Germany.

A 1956 graduate of the U.S. Military Academy, LTC Sidler earned an MS degree in nuclear engineering from North Carolina State University in 1962. His decorations include the Bronze Star Medal, Meritorious Service Medal, Air Medal, Army Commendation Medal with 1st Oak Leaf Cluster, Vietnamese Gallantry Cross with Bronze Star, and the Vietnamese Honor Medal 1st Class.

MAJ Nicholas R. Colucia Jr. is the new adjutant of the Army Research Office, OCRD, following service as director of Personnel, U.S. Army Support Command, Qui Nhon, Vietnam.

From 1968 to 1971, he served successively in Germany as chief of the AG Administration Support Branch, Theater Army Support Command (TASCOM); commanding officer, 5th Replacement Battalion and chief of the Enlisted Personnel Management Branch, TASCOM; and chief of Plans and Programs, Office of the TASCOM Adjutant General.

A graduate of the University of Connecticut where he earned a BA degree in psychology in 1960, he holds the Bronze Star Medal, and Army Commendation Medal W/OLC.

MAJ Stephen C. Hustead, serving as a research associate at the Lawrence Radiation Laboratory, in Livermore, Calif., on detached duty from OCRD.

In Vietnam during 1971–72, he served as training plans and programs action officer at HQ Military Assistance Command, Vietnam (MACV). He commanded a battery of the 30th Artillery, 1st Cavalry Division on his first tour of duty in Vietnam.

Graduated from the U.S. Military Academy in 1963, MAJ Hustead earned an MS degree in physics from Ohio State University in 1970.

His decorations include the Bronze Star Medal with OLC, Air Medal, Joint Services Commendation Medal, Army Commendation Medal with OLC, Vietnamese Medal of Honor, and Vietnamese Cross of Gallantry.

MAJ James R. Martin is assigned to the Behavioral Sciences Division, with duty station in Korea, following graduation from the Armed Forces Staff College, Norfolk, Va.

A 1962 USMA graduate, he has an MPA degree in political science from Harvard University where he is a PhD candidate expecting to submit his dissertation in mid-1973.

His past assignments include instructor and assistant professor, USMA, 1968–71; assistant G-3, HQ USAAMC, Fort Sill, Okla.; and battery commander, 1st Battalion, 29th Artillery, Fort Devens, Mass.

MAJ Martin was psychological operations/civil affairs adviser to the 23d Infantry Division, Dalat, Vietnam (1964–65). He holds the Army Commendation Medal w/2 OLCs.

MAJ John B. Nun is an Army member of the Navigation Satellite Management Office, OCRD, and recently received an MS degree in aerospace engineering from Georgia Institute of Technology.

A 1958 USMA graduate, he served in Vietnam, 1967–68, as operations officer, 125th Air Traffic Control.

In 1968–69, MAJ Nun was assigned to HQ U.S. Continental Army Command (CONARC), Fort Monroe, Va., as flight detachment maintenance officer. He has served as assistant S-3, U.S. Army Aviation System Element, Fort Stewart, Ga., and commander, 18th U.S. Army Missile Detachment in Greece.

His decorations and awards include the Bronze Star Medal, Air Medal with two OLCs, and Army Commendation Medal.

MAJ Donald F. Straetz is newly assigned as a staff officer in the International Division, after serving in Vietnam as chief, Budget and Plans Branch, Ordnance Advisory Division, MACV.

In 1960 he graduated from USMA and five years later earned an MS degree in mechanical engineering from New Mexico State University.

During his first tour of duty in Vietnam, MAJ Straetz served as assistant subsector adviser, MACV. He was mechanical/project engineer, Engineer Division, Combat Developments Command Experimentation Center, Fort Ord, Calif. (1967–69); and military assistant, Reentry Physics Division, Advanced Ballistic Missile Defense Agency (ABMDA), Washington, D.C. (1969–71).

He has been awarded the Bronze Star Medal and the Army Commendation Medal with two OLCs.

James D. Carlson has joined the AMBMDA staff after serving with Hughes Aircraft Co. as head of the Controls and Special Processors Section. He has a BSEE degree from California State University.

He has managed research activities in microwave acoustics, provided technical direction for digital signal processor development on the AN/SPS-33IV radar, and program management for microwave acoustics research and development.

Among his reports and technical papers is "Highly Dispersive Acoustic Filters," published in March 1971. Other reports have been published concerning microwave acoustics and signal processing, an area of special interest to the Electronics Command.

Joseph F. Howard is the new attorney-adviser in the Army Research Office, OCRD. With the Small Business Administration he served until recently in the same capacity.

Howard holds a BS degree in languages from Harvard University (1942), an LLB from Boston College (1949), and has graduated from the accounting course at the Army Finance School, Fort Benjamin Harrison, Ind., and the procurement law course at the Army JAG School, Charlottesville, Va.

He has served as executive officer/comptroller, U.S. Information Agency, Caracas, Venezuela; contracting officer, Air Force Systems Command, Hanscom Field, Mass.; and legal assistant, CE, Waltham, Mass.

MUCOM Compiles Management System Aid

MUCOM's Management Information Systems Directorate has completed compilation of two sizable volumes on the control system for MUCOM's Manufacturing Technology Program.

This first, 2-volume phase includes a life-cycle milestone control for each project and subproject, including the Army Ammunition Plant Management Program.

The publications are to be used as a common tool by manufacturing technology managers, project managers and project engineers throughout the Munitions Command.

The second phase of the automation effort will be oriented toward the establishment of companion control for program, budget and financial data and information.

personnel actions

Conferences & Symposia . . .

Operations Research Symposium Focuses on 'Risk Analysis'

Probabilistic Factors Supported by Most Complete Knowledge Obtainable and Mathematical Modeling Weighed for Decisions

Knowing all the relative probabilistic factors, based on every bit of reliable information you can collect pertinent to success-or-failure mathematics, how do you use risk analysis for a wise decision concerning national military power objectives?

Essentially, that is the question about 225 of the nation's professional practitioners in defense analysis and decision problems considered at the 11th annual U.S. Army Operations Research Symposium at Durham, N.C.

"Risk Analysis" was discussed as one of the key factors in the complex techniques of operations research—when many millions or billions of dollars of tax money as well as combat strength hinge on decisions.

Sponsored by the Army Chief of Research and Development, the conference was hosted by the Army Research Office-Durham (ARO-D). Army Director of Research BG Charles D. Daniel Jr. was the general chairman and ARO-D Commander COL Lothrop Mittenthal was host.

Guest speakers and technical presentations indicated clearly that during the 11 years since ARO-D began hosting the OR conferences, the state-of-the-art in operations research has progressed from the pioneering to an amazingly advanced stage. Equally clear was the consensus that the art is still far short of reliability standards decision-makers are demanding.

In a departure from previous practice, much of the 3-day conference was devoted to a series of tutorial seminars by a team from Stanford Research Institute, which has gained wide recognition for major advances in operations research and scientific analysis capabilities.

Dr. Carl S. Spetzler, a dynamic 30-year-old expert who came to the U.S. at the age of 14 from Nurnberg, Germany, and graduated from Illinois Institute of Technology (BS, MS and PhD degrees), headed the SRI team. Pointed questions were fired from all sides, but he never appeared at a loss for calmly logical answers.

Still he started his presentation by offering anyone in the audience the odds of $5 against $1 on the flip of a coin—his $5 against their $1—and won. The point he thus established is that long odds in favor of a decision "may produce a bad result."

In elaborating on this theme as a basic factor in risk analysis, no matter how methodically all the pertinent information may be collected and presented to decision-makers, Dr. Spetzler said: "There is no 'right information, a right probability, a right preference'—risk analysis tries to combine all the relevant factors with a goal of better decisions."

'Good decisions,' that is those soundly based in a logical consideration of all the known relevant factors, he explained, may have 'bad outcomes,' just as 'bad decisions' in respect to probabilistic factors may have 'good outcomes.' . . . "The purpose of risk analysis is to increase the likelihood of good outcomes by good decisions."

The tutorial seminars, he stressed, would be directed to risk analysis concepts and theories directed to subjective probabilities. As developed by SRI experts, along with many others throughout the nation, risk analysis or decision analysis is an "exceedingly powerful tool, but it does not teach you the engineering side of risk in combat decision problems."

This hard fact, he said, means that engineering talent has to simplify the task and thus improve the odds of reliability for decision-makers. A "beautiful study" may not help to make a good, logical decision, in view of the complex intangibles involved.

Decision (or risk) analysis was presented by the SRI team as employing a language and philosophy, a logical quantitative procedure, decision theory, and systems and modeling methodology.

The cycle involves the use of prior information, a deterministic phase, a probabilistic phase, and informational phase. At the end of the probabilistic phase, Dr. Spetzler said, "you know what you should do, but to improve the risk you then gather new information and look again at the uncertainties. . . ."

KEYNOTE ADDRESS. Assistant Chief of Staff for Force Development LTG R. R. Williams was scheduled to present the keynote address. When he was unable to attend, his scientific adviser, Dr. Abraham Golub, took over as the keynoter following an introduction by BG Daniel.

Golub termed "Risk Analysis," as the theme of the conference, a "most timely and opportune" selection because of the "rapidly changing environment we are living in today.

"From the standpoint of the Assistant Chief of Staff for Force Development (ACSFOR), I can summarize this new environment with a few terse phrases: reduced manpower, higher personnel costs, lower budgets, shifting national priorities and—perhaps most important of all—unprecedented public scrutiny of our defense systems acquisition processes. I'm sure you are all aware of these factors.

"My point is that every one of these factors contributes added pressure to perform the force development and equipment acquisition processes as skillfully as possible. . . . All too often we seem to be frustrated in our attempts to overcome the major cost overruns, schedule slippages and hardware deficiencies that have plagued us for so long.

"It almost seems as though there has been something fundamentally wrong or lacking in our practices, and I am convinced that the early and explicit consideration of risk may be what is lacking.

Golub described what he said might be called a hierarchy of levels at which risk analysis and decision analysis are performed in the National Defense Effort—ranging from analyses of specific weapon systems to the recently introduced "Net Assessment" of national security objectives.

The ACSFOR, he explained, must make many critical decisions based necessarily on projections concerning the availability of major modern weapon systems. He described the ACSFOR as the developer of the force structure of the future—the one who must prescribe the units and organization based on the best weapons and equipment that can be provided.

Then he stated that the Army's poor performance in producing estimates for new systems "not only handicapped the force planning process but was also detrimental to the entire modernization effort."

Using graphic displays based on case studies of several major systems, he showed the sharp contrast between the official estimates at some point in the past and the actual results. When several such systems are aggregated, he said, they exhibit a characteristic mountain "Bowwave" of projected spending.

Golub used charts to show that this Bowwave recedes and flattens with time. Actual spending for this group of systems falls far short of the 5 to 10 year projections of the earlier "snapshot estimate." Still the Bowwave is ever present, he added, and its dimensions unfortunately often jeopardize the initiation of new R&D starts.

The key point he made is that improvement of estimates through formal risk analysis would possibly bring the Bowwave down to its true size. Then it would be "much less of an inhibiting factor for starting potentially valuable new programs in this era of severely constrained budgets for the modernization program."

"When Secretary Packard [former Deputy Secretary of Defense] first gave prominence to the term 'formal risk analysis,' I believe he was clearly addressing the problems associated with the weapon system acquisition process.

"I view it as a process wherein the risks associated with a particular developmental program are identified and evaluated, and alternative courses of action for reducing risks are generated. I regard it also as a continuing and iterative type of process rather than a one-time problem solution. . . ."

The prospect is, he said, that in the years ahead only three to four percent of the Army budget will be available to accomplish equipment modernization objectives. This will permit "no latitude for poorly conceived or mistaken ventures, or major reversals of programs in midstream.

"That is reason enough for us to take careful, measured steps toward modernization, always fully cognizant of the risk along the path, and fully prepared with alternatives to surmount or bypass the risk that transforms into a technical setback.

"In conclusion, I hope these remarks have added still a little extra incentive to you and

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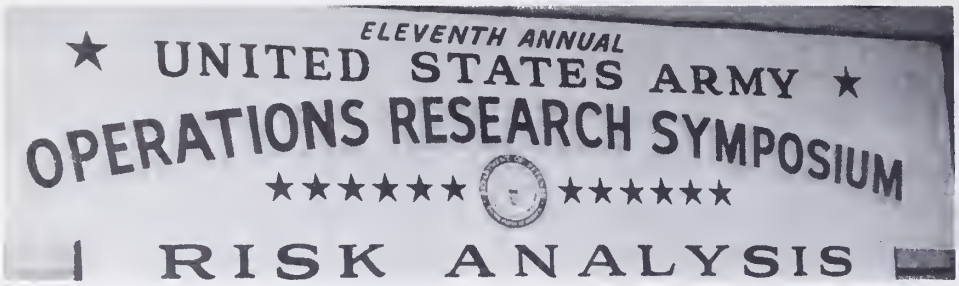

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your colleagues to accept the challenge to advance and successfully apply the techniques of risk analysis. I am convinced that by focusing proper attention on each and every program activity and event, the likelihood of adverse surprises can be greatly reduced.

"Then when problems and changes do materialize, they will have been anticipated and viable alternatives (worked out in advance) will reduce the undesirable impacts on program activities. By extending this type of careful analysis to all the major modernization programs, we would hope and expect that the critical job of Force Planning could be performed with a degree of credibility and at levels of precision that are simply not possible under present circumstances.

"Unfortunately, I fear it is the nature of this risk analysis work that you may not see the beneficial consequences of your work for several years. And even then you may not receive full and proper credit, for there will probably be some who will say things would have gone well anyway."

BANQUET SPEAKER BG Robert G. Gard Jr., director of Discipline and Drug Policies, Office of the Deputy Chief of Staff for Personnel, addressed the problems and the results to date of "The Army Drug Abuse Program."

Improved understanding of the scope and the intricate nature of the drug addiction problem within the Army, General Gard said, is contributing very effectively to the success to date of efforts to cope with the situation.

He expressed considerable optimism that the Army is well on the way to minimizing seriousness of the problem, by educational methods, psychological and physical treatment, and preventive action to curtail drug traffic.

Alcoholism is in many respects, he said, an equal if not more serious problem, and the Army considers alcohol as a drug that is as physically and mentally debilitating as some of the drugs that are now a cause of national concern. Measures are now under way to deal with alcoholism as a problem that demands much the same approach as that of dealing with other drugs.

BG Gard said the Army objective is to treat and rehabilitate soldiers who have drug or alcohol problems, and to return them to full and effective duty as quickly as possible.

Only a small percentage of soldiers who have a drug problem are discharged ahead of their normal expiration of service, he said. When long periods of treatment are involved, the desirable course is to discharge the individuals and phase them through Veterans Administration hospitals.

"Our interest remains with the serviceman when he returns to civilian life," BG Gard explained. One of the biggest problems is that of educating drug and alcohol addicts that they do have a serious problem, and that the Army can help them if they want to help themselves.

DR. NICHOLSON TRIBUTE. One of the features of the opening session was a tribute to the late Dr. George E. Nicholson Jr., given by Dr. Marion Bryson, long a chairman of arrangements for the annual conference until he was succeeded in 1970 by Dr. Nicholson.

Internationally renowned as a leader in statistics and operations research, and chairman of the Department of Statistics at the University of North Carolina for 19 years until his death in December 1971, Dr. Nicholson was acclaimed for his contributions to the success of the OR conferences from their inception in 1962.

SESSION III. In addition to the tutorial presentations by Dr. Spetzler and Ramon Zamora of the SRI team, the opening day of the conference was highlighted by a session on "Insight into Risk Taking." James E. Norman of ARO-D was the chairman and the guest speaker was Dr. Ralph O. Swalm, a professor at the Industrial Management Center, Syracuse University.

SESSION IV offered a choice of eight concurrent workshop presentations followed by question and answer discussions. Dr. Norman C. Dalkey, Rand Corp., presided at the workshop on "New Trends in Delphi Procedures." LTC Vernon Speicher, U.S. Army Materiel Command, was the chairman and Dr. Badrig M. Kurkjian, also with the AMC, was the speaker on "Adversary/Advocacy Concepts," a technique of Red and Blue Teams discussion of OR problems.

"The Bayesian Approach" workshop was conducted by Dr. Stanley Buchin, Applied Decision Systems, Inc., Washington, D.C., with presentations by Henry Ellner of AMC and Dr. Martin Messinger of Picatinny Arsenal, Dover, N.J. Leeam S. Lowin, Direct Applied Digital Data Systems, Inc., Hauppauge, Long Island, N.Y., chaired "Decision-Analytic Techniques for Problem-Finding and Solving." Members of the SRI tutorial team were the speakers.

"Extrasensory Perception in Decision Mak-

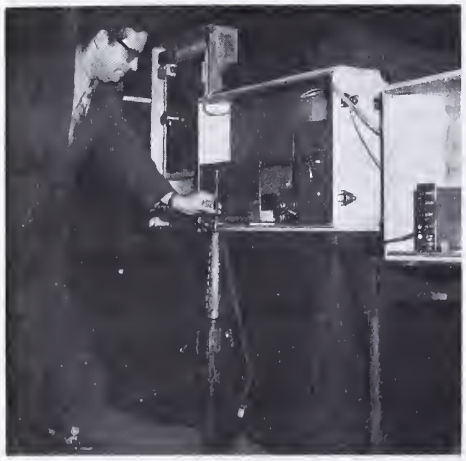
(Continued on page 50)

conferences & symposia

Protection of Public Figures Considered by Agencies

Protection of Public Figures was the subject of a 3-day symposium sponsored by the U.S. Army Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va., that recently attracted representatives of numerous U.S. Government agencies.

Among more than 100 participants were research and development personnel, security and law enforcement officials from the Department of Defense, the Army, Navy and Air Force, National Bureau of Standards, U.S. Postal Service, Department of Transportation, Department of Customs, National Capital police, Dulles International Airport police, Indiana State Police, and various other agencies.



INTERIOR INTRUSION detection system was among items demonstrated at Symposium on Protection of Public Figures. James W. Owen of the U.S. Army Mobility Equipment R&D Center (MERDC) Countermine/Counter Intrustion Department is shown setting off the alarm by removing a gun from a simulated arms rack. The system is being developed by MERDC for the joint Armed Services use.

A "Problem Overview" of the subject of the symposium was presented by Joseph Boneta, chief of the MERDC Intrusion Detection Division and chairman of a 6-member panel that discussed the problem in general.

Presentations were given on topics such as: Theory and Application of Magnetic Weapon Detectors; Portal Detector Development; Feasibility Study of Weapon Detection for Parcel Inspection Applications; Airline Baggage Inspection; Development of Equipment for Protection of the Traveling Public; X-Ray Equipment; Bomb-Transportation Equipment; Integrated Assessment Control Systems; Infrared Imaging of Concealed Weapons; and

Millimeter Imaging and Its Applications; Night Vision Pocket Scope; Hand-Held Thermal Viewer; Standards for Detection Equipment; Infrared Gun Flash Detection; Mine Data R&D Efforts Relevant to Protection of Public Figures; Explosive Trace Vapor Detection; and Atomic and Molecular Detection Techniques; Human Factors Aspects; Canine Detection; Bomb Detection Dogs in New York City; and Joint Services Interior Intrusion Detection Systems.

Demonstrations were given of a Psychological Stress Analyzer; X-Ray for Personnel Inspection; X-Ray for Parcel Detection; Magnetic and Electromagnetic Weapon Detectors; Night Vision Devices; and Explosive Detection Dogs.

BG Charles D. Daniel Jr. gives welcome.

ENVIRONMENTAL SCIENCES PANEL included (from left) Dr. Warren E. Grabau, WES; Dr. Alex Pearson, USAETL; Dr. Desmond O'Connor, OCRD; Marvin Diamond, WSMR; Dr. Andrew Assur, CRREL; Finn Bronner, Army Research Office-Durham.

SYMPOSIUM ATTENDEES included (from left) Charles E. Van Albert, CDC; James C. Richards, MUCOM; Dr. Ralph O. Swalm, Syracuse University; LTC James H. Sewell, USACCS; Dr. Donald W. Hurta, DSMS; and Truman W. Howard of the USALMC.

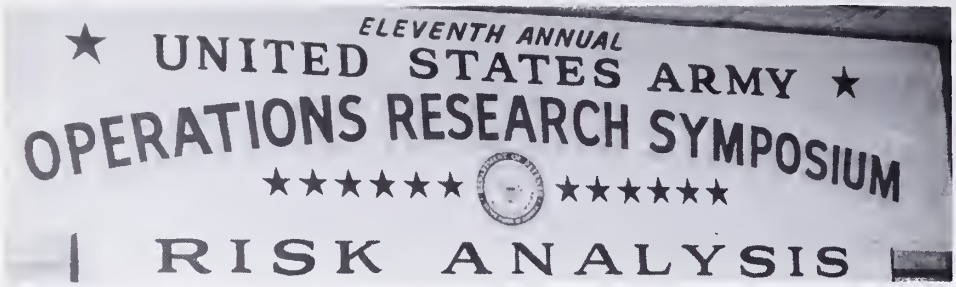
KEYNOTER Dr. Abraham Golub and ARO-D Commander COL Lothrop Mittenthal, who was host to the Conference.

ARO-D project officer for the symposium Jim Williams, registrant Mrs. Rhonda Rice.

SOCIAL HOUR DISCUSSION. From left are Raymond Beresford, RARDE, England; Dr. J. B. Gilstein, AMBDA; Lynn F. Jones, Ministry of Defence, England; Joseph Lindwarm, Army Materiel Command; Dr. Frank Grubbs, Aberdeen Army R&D Center, Md.

TUTORIAL SEMINAR leader Dr. Carl S. Spetzler of Stanford Research Institute.

INFORMAL CONVERSATION, with distaff attendees, is held by COL H. F. T. Hoffman, OACSFOR; Mrs. and COL Charles R. Darby, STAG; Mrs. Hoffman; Dr. Marion Bryson.



(Continued from page 48)

ing," a discussion of the results of parapsychology techniques and experiments, was moderated by Dr. Marion Bryson. The speakers were Dr. J. B. Rhine of the Foundation for Research on the Nature of Man and Prof. John Mihalasky, Newark (N.J.) College of Engineering.

Dr. Ralph Swalm presided at the workshop on "Plotting Your Utility Profile" and the chairman for "Reducing Risk Through Prototyping" was Dr. Dieter Schwebs, an Arlington, Va., consultant. Guest speakers at the latter workshop were COL Robert R. Lochry of the U.S. Air Force Academy and LTC William E. Thurman, Wright-Patterson AFB, Ohio.

"The Economics of Uncertainty" workshop was moderated by Dr. Edward B. Berman, Mitre Corp., Bedford, Mass. Presentations were made by Thomas P. Tytula, U.S. Army Missile Command, Redstone (Ala.) Arsenal, and Ward V. Foster, U.S. Army Materiel Systems Analysis Agency, Aberdeen Proving Ground, Md.

CONTRIBUTED PAPERS. Two concurrent sessions were held for presentation of contributed technical papers. Jerome Selman, U.S. Army Munitions Command, presided during the presentation of: "Theory of Ideal Weight in Weapons Evaluations," by David R. Howes, U.S. Army Strategy and Tactics Analysis Group, Bethesda, Md., and Dr. Robert M. Thrall, Rice University;

"A New Formulation of the Lanchester Combat Theory," Dr. Frank E. Grubbs, U.S. Army Aberdeen (Md.) Research and Development Center, and CPT John H. Shuford, The Field Artillery School; "A Note on the Thor Index of Combat Effectiveness," Dr. Robert M. Thrall and Dr. J. R. Thompson, Rice University.

MAJ Larry Walker, U.S. Army Command and General Staff College, Fort Leavenworth, Kans., presided during the presentation of the following technical papers: "Decision Risk Analysis for R&D, Dr. John D. Hwang, Ames Research Center, U.S. Army Air Mobility R&D Center, Moffett Field, Calif.;

"Risk Analysis in Military R&D Projects," MAJ A. K. Varnell, New Cumberland (Pa.) Army Depot, CPT John McGrath and Woodrow C. Holmes Jr., Army Electronics Command; "VERT—A Tool to Assess Risk," Gerald Moeller, U.S. Army Management Engineering Training Agency, Rock Island, Ill.

PANEL DISCUSSION. Dr. Desmond O'Connor, chief of the Environmental Sciences Division, Army Research Office, Office of the Chief of R&D, HQ DA, presided at a panel discussion of "Environmental Risks in Army Operations."

Panelists included Dr. Andrew Assur, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, N.H.; Finn E. Bronner, U.S. Army Research Office-Durham; Dr. Warren E. Grabau and Marvin Diamond, U.S. Army Engineers Waterways Experiment Station, Vicksburg, Miss.; and Dr. Alex Pearson, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Va.

SESSION VIII. Presentations of contributed papers were continued at two concurrent sessions. L. D. Maxim, Mathematics, Inc., Princeton, N.J., presided during: "Analysis on the Infrared Night Observation Device Long Range (NODLR)," Dr. Edward F. Allard, Army Electronics Command; "Methods for Evaluating the Effects of Expanded Ballistic Missile Threats on Defense Deployment," Mrs. Mathilde B. Sutow and Dr. William J. Douglas, Keystone Computer Associates, Inc., Fort Washington, Pa.; "Risk Analysis in the Acquisition of BMD Systems," Dr. Edward N. Dodson, General Research Corp., Santa Barbara, Calif.

George Schector, Ketron, Inc., Arlington, Va., was the moderator during the presentation of: "Risk Analysis of Casualties," Dr. Daniel H. Newlon, Office of the Assistant Secretary of Defense; "Risk Analysis in Weapons Development," Dr. Donald W. Hurta, Defense Systems Management School, Fort Belvoir, Va., and Robert C. Banash, Army Weapons Command; "A System for Near Real-Time 'Casualty' Assessment in Field Experimentation," Dr. Daniel F. McDonald, Army Combat Developments Command, Fort Belvoir.

Alternate Contributed Papers that were not presented but will be included in the proceedings of the conference expected to be distributed to all participants in August, included:

"Operations Research for Risk Analysis," Dr. Jerome H. N. Selman, Munitions Command, and Victor Selman, Computer Sciences Corp.; "Client-Centered Risk Analysis," Lawrence L. Rosendorf, Munitions Command; "Cost Growth: Uncertainty and Risk," Dr. Robert L. Launder, U.S. Army Logistics Management Center.

ARRANGEMENTS for accommodations for the conference were headed by James P. Williams Jr., project officer; LTC Edgar G. Hickson Jr., ARO-D executive officer, who also earned a listing for helping with the technical program; and CPT Robert M. Sims, ARO-D adjutant. Dr. Jerome Selman headed the technical program committee, which included Dr. Marion Bryson, Dr. Frank E. Grubbs and MAJ Charles Moore.

conferences & symposia

AMC Sponsoring Tri-Service Corrosion Meeting

The 1972 Tri-Service Corrosion Conference, in Houston, Tex., Dec. 5-7, will be sponsored by the Materials Advisory Group of the U.S. Army Materiel Command. The purpose of the conference is to make Department of Defense personnel, contractors and other interested individuals aware of important corrosion problems in military equipment; to provide a forum for exchange of corrosion control information; and to present the status of significant corrosion research projects being carried out by military services.

Sessions on corrosion research will cover high-temperature oxidation and sulfidation, corrosion-induced cracking phenomena, and special topics. Sessions on corrosion of military equipment will cover aircraft and missiles; power units; armament; ammunition; ships, submersibles, and ocean equipment; and nondestructive inspection.

Registration will be by mail only. Persons interested in attending may obtain a complete program and conference arrangements by writing to M. M. Jacobson, Army Materials and Mechanics Research Center, Watertown, Mass. 02172.

TECOM Hosts 27th AMC Meet On Automatic Data Processing

The U.S. Army Materiel Command's 27th Automatic Data Processing Senior Executive Conference was hosted recently at Aberdeen (Md.) Proving Ground by the U.S. Army Test and Evaluation Command Management Information Systems Office.

MG Charles P. Brown, commanding general of TECOM, gave the opening remarks at the 2-day conference on the AMC organizational status, budget, resources and ADP unit cost.

Other subjects included the TECOM remote testing and data entry, centralized depot maintenance by the Major Item Data Agency, Picatinny Arsenal's scientific and engineering work, and the AMC and TECOM control of systems resources.

Conferees also represented Edgewood (Md.) Arsenal, Electronics Command, Missile Command, Tank-Automotive Command, Munitions Command, Automated Logistics Supply Agency, Aviation Systems Command, Logistics Control Office-Pacific, Ammunition Procurement and Supply Agency, Weapons Command, Mobility Equipment Command, Logistics Management Center, Logistics Systems Support Center, and Logistics Data Center.

HumRRO Reports on Employability

Human Resources Research Organization (HumRRO) scientists have developed a handbook to help job counselors work with the disadvantaged to improve their chances of getting, and keeping, a good job.

Titled "An Instructional Program for Employability Orientation," the handbook should also prove useful for anyone concerned with preparing men, women, and young people for the "world of work."

Produced for the U.S. Department of Labor, the publication is intended primarily for use in the Work Incentive (WIN) Program. The second HumRRO publication to come out in hard covers, this handbook sells for $7.50.

WECOM Hosts Conference Covering Technology for Mechanical Systems

Reliability and Maintainability Technology for Mechanical Systems was the topic of a recent symposium sponsored by Rock Island, Ill., sections of the American Ordnance Association, American Society for Quality Control, American Society of Agricultural Engineering, and the Society for Experimental Stress Analysis.

The host organization was HQ U.S. Army Weapons Command at Rock Island and the purpose was to assist reliability and maintainability personnel in industry and the U.S. Government. Discussion was focused on methodology to solve technical and management problems by an exchange of knowledge.

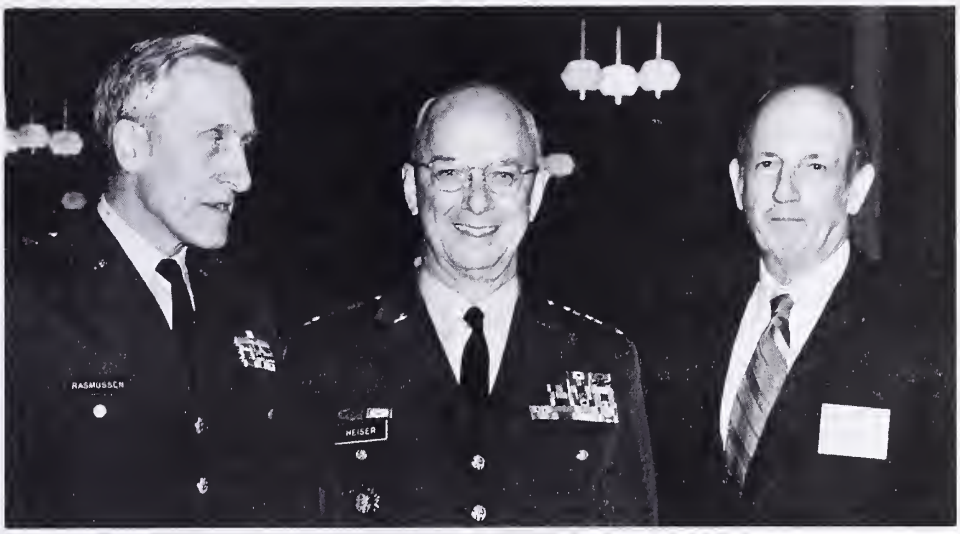
Twenty presentations were given by representatives of General Motors Corp., Texas A&M University, Deere & Co., Penn State University, Chrysler Corp., International Harvester Co., Ford Motor Co., and Department of the Army.

LTG Joseph M. Heiser Jr., Deputy Chief of Staff for Logistics, Department of the Army, contended in an address that "the value of today's symposium is not fully understood. . . .

"We have done some great things in the Army. Today's combat soldier is better supported, better equipped, and better fed than any combat soldier in the world. But we are not perfect so we must go a lot further without much time to do it."

LTG Heiser stressed the importance of obtaining life-cycle costs before the Army buys a piece of equipment, and determining the item's reliability and maintainability at least concurrently.

He cited the youth of America for special praise and closed with a tribute to the Nation's ideals and its dedication to peace.



DEPUTY CHIEF OF STAFF for Logistics, LTG Joseph M. Heiser Jr., with MG Henry A. Rasmussen, CG, U.S. Army Weapons Command (left), and LTG Jean E. Engler, USA (Ret.), executive vice president of the American Ordnance Association (right), at the recent meeting of Iowa-Illinois Chapter of AOA conducted at Rock Island Arsenal.

LTG Jean E. Engler (USA, Ret.), executive vice president of the American Ordnance Association, presented "best paper" awards to Stewart G. Miller, General Electric Co., and John F. Martin, U.S. Army Combat Developments Command Maintenance Agency.

Picatinny Conference On Warhead Technology

Information exchange by more than 30 speakers at a symposium on conventional warhead technology, held recently at Picatinny Arsenal, Dover, N.J., involved personnel from the U.S. Army Materiel Command Project Managers Office for Selected Ammunition and the arsenal.

MG E. M. Graham Jr., CG of the Army Munitions Command, welcomed about 300 persons participating in the two days of discussion.

Banquet speaker Dr. Robert Dillaway, Army Materiel Command Deputy for Laboratories, discussed weapons and explosives that have been used in Southeast Asia. Emphasis in the future, he said, should be placed on "diversity of weapons instead of jack-of-all-trades, master of none" weapons systems. He was introduced by Arsenal Commander COL George M. Montgomery.

COL K. E. Lockwood, project manager for Selected Ammunition, spoke on the "Scatterable Mine Development Program." Also representing the PMO for Selected Ammunition, MAJ Harry White presented "Indirect Fire Antiarmor" and Martin Chase, chief of the Technical Division, reported on "Improved Conventional Munitions."

Dr. Raymond Walker, chief of the Explosives Division, Feltman Research Laboratory, spoke on "The Joint Services Explosives Fill Program."

Symposium cochairmen were H. W. Painter, arsenal technical director, and COL John Ulrich (USA, Ret.), senior vice president of the Chamberlain Manufacturing Corp. and chairman of the AOA's bomb and warhead section.

Finite Element Method Theme of WES Symposium

Applications of the Finite Element Method in Geotechnical Engineering, the theme of the first symposium of its kind held in the United States, were discussed recently at the U.S. Army Engineer Waterways Experiment Station, the sponsoring organization.

More than 100 engineers and scientists from the United States, Canada, Portugal and Germany participated in the 4-day meeting at Vicksburg, Miss. Thirty-seven technical papers were presented. The finite element method is one of the newer techniques which with the aid of computers forms an effective means of solving many complex engineering problems.

Sponsored by the WES Soils Mechanics Information Analysis Center under the direction of J. P. Sale, chief of the Soils Division, the symposium included six sessions. Discussions covered Review and Theory; Dams, Excavations and Slopes; Foundations and Pavements; Seepage, Consolidation and Creep; Earthquake Analysis and Dynamics; and Structure-medium Interaction.

Hydrographic Equipment Displayed at WES Meeting

More than 100 representatives from 36 districts and 7 Corps of Engineers divisions attended a recent 3-day Hydrographic Survey Conference at the U.S. Army Waterways Experiment Station (WES).

Conducted as a means of exchanging ideas and for the display of hydrographic surveying equipment, the conference was held at Vicksburg, Miss.

Representatives of Canada, Australia, the U.S. Naval Oceanographic Office, U.S. Army Topographic Command, National Oceanographic and Atmospheric Administration, Tennessee Valley Authority and the Naval Ship Engineering Center also participated. The vice president of the American Congress of Surveying and Mapping was a special guest.

Demonstrations of hydrographic surveying equipment by 14 private firms added significantly to the discussions. Presentations of technical papers contributed to the Corps of Engineers' objective of accelerating development and procurement of efficient electronics equipment for conducting hydrographic surveys.

NCSL Holds Regional Meeting At Aberdeen Proving Ground

A one-day quarterly regional meeting of the National Conference of Standards Laboratories (NCSL) was hosted recently by the Materiel Testing Directorate (MTD) at Aberdeen Proving Ground (APG), Md.

Covering 13 regions, the NCSL is comprised of some 250 U.S. organizations in government and industry which are either management standards and calibration laboratories or maintain such activities.

APG, a member of NCSL in region five, was represented at the 13-man meeting by James M. McKinley, chief of the MTD physical test section. Also attending was John Vigliante, chief of that section's physical calibration unit.

Quarterly regional meetings of NCSL are held to facilitate an exchange of ideas and information about improved procedures and management of calibration programs. They are also oriented toward cost reduction.

The Stimulation of Young Minds . . .

Tenth Annual National Junior Science & Humanities Symposium Features Astronaut Schweickart and Loch Ness Monster Explorer

Stimulation of the minds of high school gifted students to the marvels and the opportunities of careers in science, a primary objective of the U.S. Army Junior Science and Humanities Program, was served at the 10th National JSHS by a challenging program.

Planners at the U.S. Army Research Office-Durham (ARO-D), N.C., which hosted the conference on behalf of the Chief of Research and Development, set up a trip to the moon with an astronaut, an account from a searcher for the Loch Ness Monster, an archeological trip to the Holy Land with a famed explorer, and a view of the future of genetics by an authority.

In a 3-day "never-stop" round of activities from 7 a.m. to 11 p.m., the committee also included visits to the world-famed Morehead Planetarium at the University of North Carolina, the North Carolina State University, the 5,200-acre Research Triangle Institute Park, Meredith College, and Duke University.

An inspiringly beautiful concert was given in the university's massive Gothic cathedral by the Duke University Chorale, directed by Benjamin Smith, with background music from the Duke chapel's huge pipe organ played by Gerald Frank.

The symposium climax was the announcement of five students from 31 who presented technical papers as winners in their respective regional JSHS, involving a total of more than 6,000 contestants, for an International Science Fortnight trip to London, July 26-Aug. 9. They will be accompanied by Dr. Charles Koelsche, University of Georgia, director of the regional JSHS in Georgia.

The winners and titles of their papers are: Hilda Hatcherson, Tuskegee (Ala.) Institute H.S., "The Effect of Acetylsalicylic Acid on the Development of the Chick Embryo"; Teresa L. Rittmanic, Merritt Island (Fla.) H.S., "The Effects Diethylstilbestrol Residue in Meats Has on Metabolism, Bone Formation and Abnormalities in the Developing Rodent Embryos"; and

Don Destephano, Multrie (Ga.) H.S., "Biological Control of Insects"; Robert J. Herko, Lawrenceville (N.J.) H.S., "Ionization Spectroscopy"; Theodore J. Walker Jr., Salisbury (N.C.) H.S., "The Radio Sun as Seen With a Simple Two-Meter Radiotelescope."

ASTRONAUT RUSSELL L. SCHWEICKART set the tone for the outstanding success of the symposium with his keynote address, "The Earth in Perspective"—presented in a realistic "trip to the moon" background of the darkened Morehead Planetarium at North Carolina University, Chapel Hill. He was introduced by ARO-D Commander COL Lothrop Mittenthal, following a welcome to the University by provost Dr. Morrell.

WINNERS of trip to English Science Fortnight in London (July 26-Aug. 9), and dignitaries at 10th National Junior Science and Humanities Symposium, are (from left) Robert J. Herko, Teresa L. Rittmanic, ARO-D Commander COL Lothrop Mittenthal, Theodore J. Walker Jr., banquet speaker R. H. Rines, Hilda Hatcherson, Don Destephano.

ASTRONAUT Russell Schweickart, one of many astronauts trained at the Morehead Planetarium since 1960, is flanked by A. F. Jenzano, director, at press conference after address.

With a canopy of thousands of stars "going back 10 million years" showing in the ceiling of the planetarium, Astronaut Schweickart carried to his audience—about 185 of the brightest young minds in the nation plus their teachers and 31 regional directors in the JSHS Program—his earnest conviction that they have "an important role in building the World of Tomorrow, good or bad."

Traveling through space—orbiting the earth 151 times in 10 days or going to the moon as part of the crew of Apollo IX—is an experience that stimulates, unforgettably, one's appreciation of the beauty of Planet Earth, he said. It awakens the need for concerted environmental protective action to preserve it as a habitable area, and the underlying brotherhood of man despite geographical and political areas of continuing conflict.

Astronaut Schweickart started and ended his long address in moods of lyric beauty that solidly gripped his audience as he described what they would see on their hypothetical journey to the moon with him.

In between he perhaps dwelt overlong on survival techniques—recognizing the seriousness of the situation, knowing what must be done in what time frame to survive, and calmly taking the proper action. Linking an astronaut's responses to critical situations was his way of stressing the need for environmental protective action.

Aside from his fame as an astronaut, Schweickart established "instant rapport" with his listeners by his easy, down-to-earth manner of speaking as well as by his youthful (36), attractive appearance. Long, slightly curly red hair, blue eyes, sideburns trimmed at lower ear lobe level, six feet tall, physically conditioned to a lean 161 pounds, proud father of five children, former research scientist at Massachusetts Institute of Technology, former Air Force pilot with 3,250 hours flight time (2,850 hours in jets), back-up crew command pilot for NASA's planned Project SKYLAB launching in 1973—all combined to give him the image appreciated by his audience.

The goal of his address, he said, was to "give them an altered perspective. . . . I'd like to start out by asking you all to imagine that you are not here at all in fact—that you are all together but we are no longer on Planet Earth. I'd like for all to think you are gathered today as participants in the galactic environment. . . .

"I'd like you to believe that we are all members of the Galactive Environment Federation and that we are gathered to discuss that environment. I'd like you all to imagine that this is not happening in the future but is,

conferences & symposia

in fact, happening right now—today!

"What I am asking you to do is go on a space trip but not a time trip. . . . If you want to go as a little green man, go ahead. . . . You are all gathered here for no less an objective than to debate and activate the responsibilities of the Federation in protecting the galactic environment. . . ."

Placing his listeners on Antares 4 as inhabitants (in fancy), he said that "Man, in his turn, in some ways not unlike a cancerous cell, has spread himself across the habitable part of that planet, the land areas . . . and now some of the ocean, in some ways almost oblivious to the warnings of Euclid's geometry, which tells us all that a sphere has finite limits.

"And yet this particular creature, man, plunges on, reproducing himself in vast numbers, as if he was living in fact on an infinite plane—and that lying just below the surface of that plane there are infinite resources and an infinite capacity to handle his waste products and garbage.

"I do not really point this out in a doomsday manner, because I don't think it is, but I do think that man has been living in somewhat of an imaginary world. I think it is interesting to go on from there and to think what will happen. I think it is obvious that this planet is a lot tougher than man, and that regardless of what man does on this sphere, in all likelihood when he is gone, the planet will not miss him very much.

"The forests will still be green, the sky and the ocean will still be blue, and there will be a tremendous diversity of life after man has gone. The real question is, when is that going to happen, sooner or later?

"I think that there's the pity. It's sort of a shame to think that here we are, living on this beautiful planet, as far as we know the most complex form of life which exists on this planet—the only form we know of that has an aesthetic sense, a self-awareness, a capacity to create art and music, to feel for one another, and yet seemingly lacking the ability to control ourselves, and bring ourselves into balance with the rest of life on this planet.

"But I dare say that the game is far from over, in fact I propose that the game has just begun. I would propose that the players we are going to find in the near future are you. And so, as a fact, I have a relatively optimistic view when I look toward a basic element of life, which is survival."

Astronaut Schweickart, following his lengthy discussion of the problems of knowing what to do and reacting properly in a survival situation, turned to a discussion of his observations and reactions during 10 days he was in orbit around the earth.

". . . You see hundreds and hundreds of boundaries, all kinds of boundaries. Most of them are man-made and most of them are fictitious. You don't see them as boundaries. You know they are there because you are

(Continued on page 54)

Director of Army Research Participates in JSHS Advisory Committee Meeting

Army Director of Research BG Charles D. Daniel Jr. attended the 23rd meeting of the Advisory Committee of the Junior Science and Humanities Symposia Program, as a prelude to the 10th annual National JSHS. COL Lothrop Mittenthal, commanding officer of the Army Research Office-Durham, N.C., presided.

With a view to determining the direction of future planning and the possible expansion from the current 31 state and regional symposia (total of 38 states) held annually—to achieve "true national status by representation from every state"—program objectives were discussed as follows:

- To promote the study of the sciences and mathematics, particularly at the high school level; to demonstrate the part which the humanities play in the development of the scientists; to emphasize the importance of both the sciences and the humanities to the national culture and general welfare;
- To search out potentially talented youth and to assist in developing their interests and abilities;
- To provide recognition and prestige in the school environment for students who demonstrate an aptitude for, and appreciation of, the sciences, including mathematics;
- To assist the career-choosing process by revealing the variety of opportunities in the sciences;
- To further efforts to improve the prestige, professional preparation and recompense of teachers.

Considerable discussion developed relative whether greater or less emphasis should be directed to the humanities aspects of the JSHS Program. Further consideration of this issue is contemplated, along with an effort to increase the base of industrial sponsorship.

BG Daniel cited the recent call of President Nixon for action to strengthen the nation's technical and scientific base, supported by a similar appeal by Director of Defense Research and Engineering Dr. John S. Foster Jr., as reasons for bolstering the U.S. Army JSHS Program.

who has served continuously since its inception in 1960. Dr. Weber, long the president of Brooklyn Polytechnic Institute, has served as chairman of the committee since 1963 and has announced his imminent retirement. He is currently chairman, Division of Research, National Research Council, National Academy of Sciences.

In California, which was pointed out as a "model for obtaining strong industrial as well as academic support" of the JSHS Program, the regional symposium is currently being supported by about 150 industrial firms. The consensus of the Advisory Committee appeared to be that "dynamic growth of the program demands that we find new ways of obtaining support."

This view was expressed strongly by Dr. S. C. Donnelly, Durham, one of four retiring recipients honored at the meeting with Outstanding Civilian Service Awards in recognition of their long and devoted service to the JSHS Program.

Signed by Chief of Research and Development LTG William C. Gribble Jr. and presented by BG Daniel on his behalf, similar award citations commended the invaluable contributions of Dr. Ernst Weber, Dr. Sherwood Githens and Dr. George R. Seidel.

Dr. Donnelly, retired Western Electric Co. scientist and executive, was cited as a charter member of the JSHS Advisory Committee

Dr. Githens was acclaimed for distinguished service as senior adviser to the Army Research Office-Durham for the JSHS Program since its inception in 1958. He has served as an Advisory Committee member since 1966 and was credited in the award citation with pioneering in many of the cooperative arrangements that have contributed to growth and success of the program.

Dr. Seidel, visiting professor, Department of Chemistry, Delaware State College, was honored for distinguished and dedicated service to the Advisory Committee from July 1, 1960 to June 30, 1972.

The committee currently consists of 14 members, most of them distinguished in the industrial or academic world for roles in science.

OUTSTANDING CIVILIAN SERVICE AWARDS are presented to Dr. Stanley C. Donnelly (left) and Dr. Sherwood Githens (center) by Army Director of Research BG Charles D. Daniel Jr. Similar award citations were also presented to Dr. Ernst Weber and Dr. George R. Seidel for their service as members of the Advisory Committee of the Junior Science and Humanities Symposia Program, Dr. Weber as Chairman since 1963.

The Stimulation of Young Minds . . .

(Continued from page 53)

human, but you look down in that surface and they are not there. Yet on either side of that imaginary line you have people who are killing each other, who are stealing from each other, who hate each other.

"It is the most distressing of ironies when you see that, when you recognize that. Because here you have that spectacular view of this whole planet that you are going around all the time, and that's your home—that's your home planet, and you really see it as home.

"Now let's step one step further. Let's get away from the earth. Let's take another step to where a lot of my friends are going. [The Apollo 16 mission was then in progress.] And now I think that the same thing goes even . . . even further. Because now you are out far enough where you don't see those individual countries as much . . . the details don't show up as much. . . .

"But now there's that planet out there and it is really round. I mean you look out the window and it's a little thing. It no longer goes from horizon to horizon. It's just kind of a small, bright blue ball. . . . You look out there in that very, very black sky, and there's this almost like a blue and white Christmas tree ornament. It's sitting there, half lit up, just shining in that black sky. . . .

"You look around you, you look in any other direction, through any other window, and there's nothing there . . . nothing except stars, still painted white, and you get around to the moon. You look at that surface of the moon and it's a lot different. If you will now, picture yourself on the surface of the moon, and you've all seen enough pictures to know what that looks like. Picture yourself standing there, and the guys who actually stand there, let me guarantee, are no different than you.

"And you stand there and you realize that you are standing on a surface that has been bombarded for billions of years, and that there has never been another, not only human but no other form of life, that has stood there before.

"You look in that sky and there's the Planet Earth, the Planet 3 Alpha, your home! You look at it and it's small. Now put your thumb up between your eyes and the earth. It's all gone. Everything that means anything to you, all of the life that we know in the whole universe, all of the love, the joy, the agony, the music, the war, the miracle of birth, the hate—all the joy of life is gone. There's nothing left. Then you take down your thumb and there it is again.

"And I think if you are able to do that, either mentally here or physically there, when you have experienced that, you are never going to look at that Earth in the same way again. You are, in fact, a different person.

"In closing, I would like to read something Archibald MacLeish wrote on Christmas Day in 1968 in the *New York Times*. In closing his essay, while Apollo 8 was on its way home, the first time that man had been around the moon, he wrote:

" . . . To see the Earth as it truly is, small and blue and beautiful, in that eternal silence where it floats, is to see ourselves as riders on the Earth together, brothers on that bright loveliness in the eternal coals, brothers who know now that they are truly brothers."

LOCH NESS MONSTER? Based on investigations to date as one of the leaders of a joint expedition to determine whether the Loch Ness Monster of Scotland is fact or fiction, National JSHS banquet speaker Robert H. Rines, also a new member of the JSHS Advisory Council, has strong convictions.

Pending further investigations on an expedition planned for this summer as a continuation of the 1971 venture, Rines is not prepared to make a flat, unequivocal answer to the fact or fiction question. But he scoffs at scientists for not considering evidence from "credible and reputable observers."

In his own mind, there apparently is little room for doubt that a huge dweller(s) of the extremely deep and murky waters of Loch Ness does exist. In support of his belief, he showed 1971 expedition pictures in discussing "The British-American Search for the Creatures in Loch Ness."

President of the Academy of Applied Science in Belmont, Mass., Rines presented additional strong evidence that one or more "monster(s)," with an ancestry perhaps dating back thousands of years, "hopefully" will be found.

HUMANITIES ADDRESS. During the decade since the National JSHS was initiated by the Army Research Office-Durham, following extensive exploration of the degree of interest in regional and state JSHS, the humanities address has been a feature of the annual meeting. Many of the nation's top scientists and educators have contributed their talents as speakers.

"The Science of Archeology in the Holy Land" was presented this year by Dr. Bernard Boyd to maintain the reputation for excellence of this feature. Dr. Boyd is the James A. Gray Professor of Biblical Literature at the University of North Carolina at Chapel Hill.

Each summer that he ventures on one of his archeological expeditions to the Holy Land to add to his eminence as one of the world's foremost authorities on religious history dating back many thousands of years, Dr. Boyd selects a number of young archeological students to accompany him. This accounted partially for the high degree of interest in his address, a fascinating account of his observations and experiences, punctured by lively wit.

SCIENCE ADDRESS. Dr. Carey H. Bostian spoke on "Human Genetics—Progress and Promises" in giving the science address during the National JSHS session at Meredith College, Raleigh, N.C. He was introduced by Dr. John Yarbrough, professor of biology, following a welcoming address by Dr. John E. Weems, president of the college.

Acclaimed as one of the world's leading geneticists and the author of numerous books on the studies that have earned him renown, Dr. Bostian is credited with developing many of the research techniques that have helped in recent years to enhance the credibility of genetics investigations.

HUMANITIES ADDRESS on "The Science of Archeology in the Holy Land" was presented by Dr. Bernard Boyd, professor of biblical literature at the University of North Carolina, Chapel Hill, N.C.

conferences & symposia

ARO-D arrangements staff for 10th NJSHS included (from left) Norman Latta, Patricia Ashe, Adjutant CAPT Robert Sims, Mrs. William Osborne, James Williams. Donald C. Rollins, director, JSHS Office, and LTC Edgar G. Hickson Jr., ARO-D executive, who were not present when photos were taken, were also credited with being largely responsible for symposium's notable success.

Dr. Bostian, however, voiced numerous reservations about the state-of-the-art as related to widespread news media claims that have caused the general public "to think that the complete control of development and genetics is only a few years away."

"Recently," he stated, "Friedman and Roblin, in an article in SCIENCE, urged that there be no more attempts at gene therapy until science can be more certain that introduced DNA consists only of the desired type, that the viruses used be proven to be harmless, and lacking in other genetic material that might introduce undesirable genes.

"Another caution about gene therapy is based on our not knowing how a gene will perform in the close company of other genes. It is well known that genes often have different consequences when moved from one chromosome to another. The control mechanisms of genes are as important as the functions of the genes themselves. . . .

"Predictions of test-tube babies are based on in-vitro fertilization of eggs and their culture for several days. The few examples of genetic engineering which have been described quite briefly may serve as the foundation stones for genetic therapy for diseases in the future, but are no more than a small step on a long journey which must be taken before attempting to improve genetic codes we now possess. . . .

"If society ever decides to follow a program of genetic improvement, there are easier and proven ways to accomplish such goals, as the animal and plant breeders have demonstrated many times. Controlled matings, with artificial insemination, will be easier to use than genetic engineering. . . ."

DINNER ADDRESS. In the hectically busy schedule that was programed, a schedule that kept participants traveling much of the time in a motorcade of five huge buses from one point to another, not much time for relaxation was afforded.

Humor in large measure was provided, however, by Dr. Guy Owen, professor of English at NCSU, when he spoke at a dinner on "A Southern Novelist Looks at the South." The speech of the author of *The Flim Flam Man,* reproduced as a movie, was an account of many of his hilarious experiences as a youth which led him into a literary career. He read a number of passages from some of his most popular publications.

OTHER HIGHLIGHTS. Discussion panels conducted concurrently gave students a choice of hearing many distinguished research scientists and educators, followed by question and answer discussions. During a visit to the Gross Laboratories, Duke University, Dr. Robert Gaither, University of Florida moderated a panel on "Power versus Ecology."

Speakers on this subject were Dr. Thomas S. Elleman of North Carolina State University (NCSU), Dr. Emil T. Chanlett of the University of North Carolina (UNC) and David Mosier, Carolina Power and Light Co.

Dr. William Pollitzer, University of North Carolina, moderated a panel on "Human Genetics," featuring as speakers Dr. Phil Buchanan and Dr. Maurice Whittinghill, both of UNC.

"Foods from Engineered Foods" was moderated by Dr. David Bailey, noted foods researcher from the U.S. Army Natick (Mass.) Laboratories. Speakers were Dr. Daniel E. Carroll, NCSU, and Dr. Max Brockman, Natick Labs.

Dr. Trois Johnson, Carolina Population Center, presided over a panel on "Zero Population Growth." Speakers were members of his staff, Edward Trainer and Thomas Steahr. "Limits of Human Stress" was moderated by Dr. Maynard Miller, Michigan State University, known for his research in cold regions and remembered as banquet speaker at the Ninth National JSHS. Duke University faculty members Dr. Carl Eisdorfer and Dr. Edward Buckley served as panelists.

"Parapsychology: Its Past, Present and Future," moderated by Dr. Sherwood Githens of Duke University, featured as panelists Dr. David Rogers, UNC, William G. Roll and Dr. Robert Morris, both of the Psychical Research Foundation of Durham, N.C.

A Panel on "Biomedical Engineering" was moderated by Dr. Howard Clark of Duke University and Dr. Howard Wachtel and Martin Fox of the Duke staff. "Natural Sources of Air Pollution," presided over by Lyman Ripperton, UNC, offered presentations by panelists Dr. Joseph J. Bufalini, Environmental Protection Agency, and Dr. Harvey E. Jeffries, UNC.

LABORATORY TOURS. During a visit to North Carolina State University, symposium participants were given a choice of touring the Nuclear Reactor Laboratory, the Food Science Laboratory, the Phytotron, or the Animal Reproduction Laboratory. While at the University of North Carolina, they had a selection between the Radioactive Wastes Disposal Lab, the Termite Biology Lab, the Stereo Chemistry Lab, the Computers and Man Lab, Cardiovascular Surgery, Astrophysics Lab, or Ecology of Water Pollution Lab. At Duke University the students attended the Medical Center.

Similarly, during the trip to the Research Triangle Park—where many of the nation's largest industries have combined with governmental agencies in erecting some extremely large and architecturally innovative research laboratory buildings—a choice of tours was offered: Beaunit Corp., Burroughs-Wellcome Co., the Environmental Protective Agency, Forest Sciences Laboratory, Hercules Co. Labs, National Institute of Environmental Health Sciences, National Center for Health Statistics, the Research Institute Triangle Labs, and the Triangle Universities Computation Center.

PRESENTATIONS OF PAPERS. Thirty-one papers on research projects were presented by students, one each selected from the 31 regional JSHS that were conducted during the past year. The quality of the papers was adjudged exceptionally high, presenting difficult decisions by student judges.

Four black students presented papers and two of them were among the five winners selected to go to the English Science Fortnight in London this month.

Acclaimed by numerous adult scientists, who drifted from one session to another, as perhaps the most precocious research project report was that of *Theresa L. Rittmanic,* a 17-year-old senior at Merritt Island (Fla.) H.S. Three of her four years in high school (she stopped only during her junior year to go into another research project that earned her high honors) were devoted to research on "The Effects Diethylstilbestrol Residue in Meats Has on Metabolism, Bone Formation and Abnormalities in Developing Rodent Embryos."

Teresa's goal was to establish proof positive that this chemical, an additive to food for beef cattle, is a cause for concern about health of human consumers as well as for breeders of beef cattle. She said the Department of Agriculture has evidenced interest in her determinations, and that she "hopes to interest Ralph Nader."

"Until Lloyd D. Griffith became my instructor," she said, "I hated science. He's a truly fabulous teacher. Some day, I'll be able to help him for what he did for me. Right now, I'm not capable." She plans to go into the field of environmental law.

Hoping to go to Duke University, Teresa has an older sister and three younger brothers. Her father is a real estate man in Titusville, Fla. Her hobbies are "making my own clothes, swimming, boating and dancing," but she spends a lot of her spare time at the Merritt Island Center trying to help retarded children.

Don Destephano, a Science Fortnight trip winner, is 17 and has won more than 30 honors awards in high school science fair competition, including several scholarships. He hopes to enter the University of Georgia this fall, and to pursue a career in scientific research, specializing in entomology and photography, the latter his principal hobby ("$1,000 worth of equipment"). He has lived all his life in Moultrie, Ga., where his father is a retired sheetmetal worker.

Among Destephano's awards is a $6,000 scholarship from the National Science Teachers Association in a competition to select "Tomorrow's Scientists and Engineers," a $2,000 scholarship in the Georgia State Junior Science Fair, sponsored by the Franklin Foundation, and a fourth-place over-all award in the 1971 International Science and Engineering Fair.

Hilda Hutcherson was selected for the trip to London in recognition of her research establishing that varying amounts of aspirin may be a cause of birth defects of a physical nature and brain damage—based on experiments involving injection of solutions in chick embryos.

Winner of a 4-year scholarship award to Stanford University, starting this fall, Miss Hutcherson plans to major in biology. During four years of H.S. science club membership, she did not compete for awards until this year.

Daughter of an Army sergeant, John F. Hutcherson, Hilda has three brothers and a sister, all younger than she is. Her mother is an elementary school teacher in Louis Adams School in Tuskegee, Fla.

Theodore D. Walker Jr., a senior at Salisbury (N.C.) J.S., is a 5'2" sprightly youngster with unbounded self-confidence, bubbling-over zest for life, ready humor and an ambition for a career in political science. He participated in science fairs as a sophomore and junior but did not emerge as a real winner until this year.

His hobby, operating "ham" radio station WB4MF, led him into the research project that won him the trip to the forthcoming Sci-

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The Stimulation Of Young Minds

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ence Fortnight. His prize-winning paper, "The Radio Sun as Seen With a Simple Two-Meter Radiotelescope," was based on his studies of electromagnetic radiations. He reported that his radio telescope is capable of isolating 144 Mhz radio signals emitted from the sun.

Walker's father is a Baptist minister in Salisbury and his mother is an elementary school teacher. Theodore plans to enroll at the University of North Carolina at Chapel Hill in September.

Robert J. Herko presented "Ionization Spectroscopy" to win the trip to the Science Fortnight, but winning has been a steady influence in his life during five years of competition in H.S. and junior science fairs. He has received "30 to 35 awards" in local, state, regional and International Science and Engineering Fair competition, including six first places, the latter in 1971. He also is the recipient of a $6,000 4-year scholarship awarded by Humble Oil Co.

An only child whose father is a safety engineer with the General Accident Insurance Group in Piscataway, N.J., and whose mother is a secretary, Robert is a 6'2½" young man of 17 whose massive frame carries no extra weight. His hobby is music and he had directed several bands. He plays all woodwind instruments and the guitar.

He plans to enroll at Princeton University in September and to pursue a career in theoretical physics.

Penn State Honors Eifler For Outstanding Achievements

Ceremonies honoring LTG Charles W. Eifler, CG of the U.S. Theater Army Support Command, Europe (TASCOM), Worms, Germany, as a distinguished alumnus of Pennsylvania State University, were held July 1.

Established by Penn State in 1951 to recognize and salute the achievements of outstanding alumni, the DAA was presented to LTG Eifler at the annual Alumni Institute and Class Reunions program. Only 118 individuals have been thus honored.

LTG Eifler is the highest-ranking officer in the United States Army to have graduated from Penn State.

Promoted to lieutenant general in 1969, after more than 32 years military service, he became CG of TASCOM one year later.

Graduated with a BS degree in civil engineering from Penn State in 1936, he earned his master's degree in electrical engineering from Massachusetts Institute of Technology. His military schooling credits include the U.S. Army Command and General Staff College and the Industrial College of the Armed Forces.

General Eifler is the recipient of two Distinguished Service Medals—one for "extraordinary professional competence" during an 18-month tour in Vietnam. Among his other decorations are two awards of the Legion of Merit, two Bronze Stars, and two Air Medals. He has been cited by the governments of both South Korea and South Vietnam.

Army Seeks Improved DSCS Power Capabilities

Transmission and receiving capacity of earth terminals in the nation's Defense Satellite Communications System (DSCS) is expected to increase many times by use of communications equipment being developed under an Army research and development contract.

In accordance with terms of a $3.82 million contract awarded under the technical guidance of the Army Satellite Communications (SATCOM) Agency, the work is to be done by the Ratheon Co., Lexington, Mass.

The agency has announced that the new equipment will permit the use of a technique known as time-division multiple-access, in which a single military communications satellite is shared by a number of earth terminals. Feasibility of this technique has been demonstrated in tests by a commercial firm, and it is proposed for all unclassified information in Phase II of the DSCS.

Phase I, originally directed toward R&D, has provided the Department of Defense with a worldwide communications network since 1967, utilizing 23 low-power satellites drifting slowly in orbits nearly synchronous with the earth's rotation. Twenty-nine earth terminals are deployed globally.

Development of the new equipment is part of Phase II, which will use more sophisticated satellites and terminals in the global network.

In time-division multiple-access operation, each terminal sharing a satellite transmits for a short period of time, then stops to give each of the other terminals its turn. The time periods are extremely short—measured in millionths of a second—and the equipment is designed so that the users are not aware of the interruptions.

The equipment will employ highly reliable circuitry with built-in fault location and circuit protection devices to keep transmission errors at a minimum. The units must embody nearly automatic control for satisfactory operation of the system.

New Lab Facility Opens For Terrain Load Tests

Ceremonies marking the official take-over of a new $2.5 million Track and Suspension Laboratory, the first of its kind for the U.S. Army, were conducted recently at HQ Tank-Automotive Command, Warren, Mich.

Providing 45,000 square feet of floor space, the building is the first constructed on the 340-acre Detroit Arsenal since 1956.

Equipment consists principally of hydraulically actuated fixtures in the form of shaker-test platforms used for testing frame, suspension and track components and systems under simulated dynamic field conditions. Military vehicles weighing up to 60 tons can be supported for tests.

TACOM engineers can simulate in the new laboratory the loads and terrain profiles that comparable vehicles or components would experience in field service. Findings are used to develop suspension design and performance criteria for improved vehicles.

Stresses and strains, including a wide variety of movements to simulate conditions of paved highway, gravel roads, cobblestones and hilly terrain, are recorded.

Data needed to program the road-simulating equipment actually are gathered, for computer programing purposes, from vehicles operated over a variety of rugged terrain conditions at Aberdeen (Md.) Proving Ground and other Army test courses. Tape recorders mounted in vehicles for these tests provide the data needed to program the TACOM laboratory equipment.

TACOM engineers are hopeful that the new laboratory will greatly reduce the current conventional road-testing costs for vehicles, such as from $3.00 to about $1.00 a mile for the tracks alone. Simulation testing also enables engineers to correct critical track and suspension deficiencies more quickly, thus substantially reducing development lead time.

Metal Cycling Control Parley Preventive Maintenance Clue

Cycling and control of metals will be examined in an environmental resources conference Oct. 31-Nov. 2 in Columbus, Ohio, under cosponsorship of the U.S. Environmental Protection Agency, the National Science Foundation and Columbus Laboratories.

Divided into five sessions, the conference will focus on sources of trace metals in the environment, transport and effects, control processes, monitoring for trace metals in the environment, and economic and legal aspects of pollution.

Conference cochairmen are A. W. Breidenbach, director, National Environmental Research Center, Cincinnati; Dr. Robert Rabin, program manager, Division of Environment Systems and Resources at the National Science Foundation; and C. J. Lyons, manager, Department of Biology, Environment, and Chemistry at Battelle-Columbus.

MERDC Considers Barges For Improved Logistic Support

Two air-cushion barge concepts are being considered by the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va., as a means of improving logistical support over water obstacles.

A helicopter-towed, air-cushion barge referred to as HETACUB would be used over inland waterways, swamps and inundated areas where the water depth, dikes and vegetation combine to form an impasse to current surface equipment.

In addition to augmenting the helicopter payload, it could be positioned to otherwise inaccessible gun sites to serve as an artillery platform. Envisioned as an aluminum shell fitted with a multicell air-cushion system, it would come in 5- and 20- ton sizes. Towing would be accomplished also by drone, a ground effects machine (GEM) or even conventional water craft where conditions permitted.

The second air-cushion barge concept under study is a 66-foot, 20-ton capacity amphibian tailored to transport the 20 x 8 x 8 foot military container. Load sharing wheels would provide land propulsion and gradability. Twin marine propellers are planned for water movement. A stern ramp would offer a self-loading feature. The air-cushion system would reduce drag to permit good water and land speeds.

Oil Samples Studies Yield Preventive Maintenance Cue To Limit Aircraft Crashes

Army aviators enjoy a safety bonus through the technique of oil sampling at Fort Rucker, Ala., which detects excessive wear in helicopter and airplane engine components. Possible aircraft failures are averted by timely maintenance.

Clues to hazardous mechanical conditions, rarely obvious, are clearly evident in the condition of oil samples examined daily by the Oil Analysis Section of the Army Aviation Test Board Maintenance Branch.

With the safety of fliers and their equipment at stake, the Aviation Test Board looks for telltale indications of "trouble" in sampling oil from aircraft components.

Organized as part of the Army Test and Evaluation Command, the board uses a staff of chemists and technicians assigned to the "Oil Lab" to provide supporting services for military aircraft operators located in seven southeastern states.

The bulk of board business, however, comes from the Army Aviation School, which operates approximately 900 aircraft at Fort Rucker, and from the Aviation Test Board.

Some 1,800 half-ounce oil samples are analyzed each week to determine the concentration of seven different wear metals. These concentrations, and the rate of increase between samples, give an indication of the condition of the components from which they are taken.

As samples reach the laboratory, they are sorted by aircraft type, component type, and component serial number. They are then placed in an emission spectrometer where a high-voltage spark fires the oil and the light given off is measured.

Light measurements, in terms of parts per million of metal, are computed by a data compiler and passed to a keypunch and data typewriter. The information produced is recorded on file cards. Results are evaluated by comparing current readings with those already on file.

The Oil Lab began operations in 1961. Since that time, some $24 million worth of excessively worn components have been replaced upon recommendations of the laboratory.

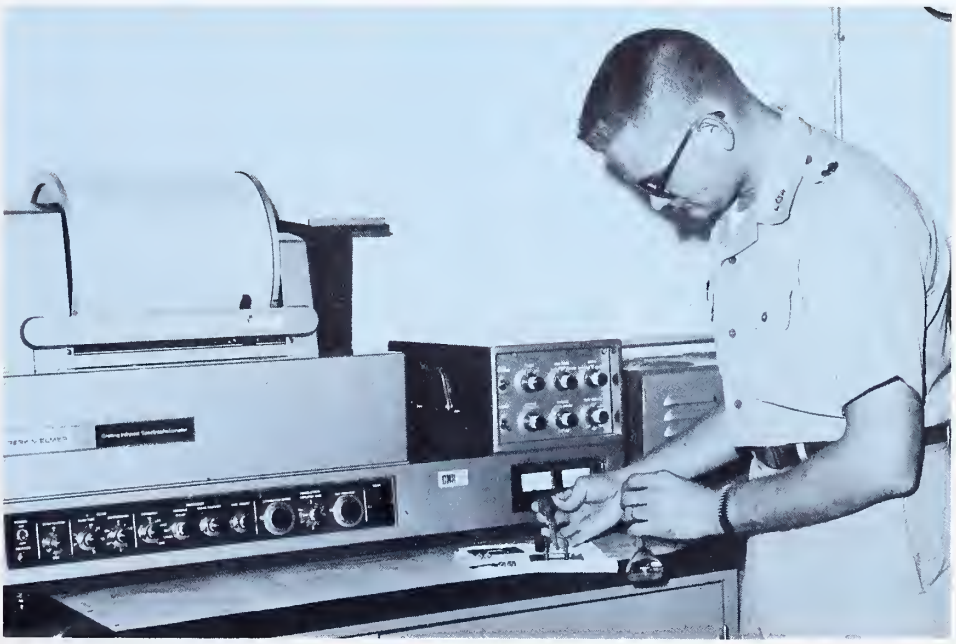
Aviation Test Board officials point out that the expense of replacing faulty components is just a small fraction of what is involved when an aircraft fails in flight. The cost of damaged materials can be assessed readily enough, they said, but "we cannot put a dollar sign on the human lives that may be involved."

The Oil Lab also has the capability of running many chemical and some physical tests and analyses for the Aviation Test Board.

Ernest Spano, chemist, uses a microscope to determine what action should be taken during oil sampling tests at U.S. Army Aviation Test Board, Fort Rucker, Ala.

Cecil Bradshaw, physical science technician, breaks down oil sample to measure as many as 16 different metals during tests conducted in Oil Analysis Section.

SP4 Michael G. Choate, petroleum analysis specialist, receives oil samples where they are sorted by aircraft type, component type and number before they are sent to the spectrometer for analysis.



CPT Richard K. Thomas, head of the Oil Lab, uses grating infrared spectrophotometer.